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LETTERS TO THE EDITOR

Phase contrast microscopic examination of hematuria to localize the source of bleeding

Hematuria is a common diagnostic problem in clinical practice. It could be of renal origin or due to conditions affecting the lower urinary tract. Extrarenal diseases could also lead to hematuria. It is mandatory to investigate every case of hematuria to localize the site of the bleed as the protocol for the investigations and management for patients with glomerular hematuria is different from that of non-glomerular hematuria. In a developing country like ours, the high cost of hospital stay and invasive or expensive procedures are not preferred. Thus, it is vital to have a simple, sensitive, preferably non-invasive screening test like examination of the urinary sediment which would separate these two groups of patients.

Presence of dysmorphic red blood cells (more than 20 percent) in cases of significant hematuria has been accepted as an indicator for the hematuria of glomerular origin[1]. In 1979 Birch and Fairley reported that the source of bleeding in the urinary tract could be determined by phase contrast microscopic examination of urine from patients with hematuria[2]. Identification of the source of bleeding was based on the morphological appearances of the red blood cells which were round in shape (isomorphic) if bleeding was from the lower urinary tract and irregular in shape (dysmorphic) if the bleeding was glomerular in origin. Subsequent papers confirmed the results[3 - 7] while others disputed the reliability of this approach[8-9]. Microscopic examination of fresh unstained urine specimens is a simple, noninvasive technique which can be performed in the outpatient clinic; the result can be obtained within a few minutes. If phase contrast microscopy proves a reliable method of detecting glomerular bleeding it will greatly assist the patient's management. We therefore, reviewed this approach to the identification of the bleeding site to determine its value in clinical practice.

The study was carried out during the period June 2006 to June 2007 on 50 patients with significant hematuria more than 5 red blood cells per high power field of the standard urinary sediment[3,4]. The ages of the patients ranged from 1-70 years. Fresh midstream urine samples (10-20 ml) were obtained from patients attending the vasculitis, urology, and cystoscopy clinics and from patients admitted to the urology wards. The age, sex and relevant medical history were recorded for each patient. Multistix test papers were used for detecting the presence of protein (albumin) and hemoglobin. The change in the color was noted and compared with the standard provided. The urine samples were prepared for light microscopy as follows: 10-20 ml of urine was centrifuged for 5 min at 400 x g in an IEC Centra-7R centrifuge. The urine was prepared for phase contrast microscopy as follows: in cases of macroscopic hematuria one drop of sediment urine was transferred to a labeled glass slide. A cover slip was placed on the specimen.

Hematuria was considered to be present when one red blood cell per two high power fields was seen. The morphology of red blood cells was classified as either dysmorphic or isomorphic. Dysmorphic red blood cells had irregular outline, membrane protrusions, areas of loss of the membrane, irregular deposits of dense cytoplasmic material around the cell membrane, and variations in size. Isomorphic red blood cells had a smooth or crenated outline. If more than 20% of the red blood cells were dysmorphic and less than 80% were isomorphic glomerulopathy was diagnosed. If less than 20% of red blood cells were dysmorphic and more than 80% were isomorphic, glomerulopathy was excluded.

Red blood cell casts and hemoglobin casts were identified by their red color, and intact red blood cells were seen at the cytological results were correlated with the clinical history of the patients.

Twenty cases of glomerulonephritis with hematuria were studied (Table I). Acute glomerulonephritis was diagnosed according to traditional clinical and laboratory criteria, the other glomerulopathies were all confirmed by kidney biopsy and 25 cases with hematuria resulting from non-glomerular causes were also included in the study. Five patients were unknown diagnosis. Twenty of the 50 patients has dysmorphic red blood cells of more than 20% and isomorphic red blood cells of less than 80%. 25 patients had dysmorphic red blood cells of <20% and isomorphic red blood cells of >80%. In the 20 patients with more than 20% dysmorphic red

Table I: Causes of hematuria

Cause	Total cases
Glomerular	
Minimal change nephritic syndrome with mild mesangial matrix increase	1
Acute glomerulonephritis	8
Focal proliferative glomerulonephritis	2
Chronic glomerulonephritis	2
Crescentic glomerulonephrits	1
Mesangioproliferative glomerulonephritis	3
Membranous glomerulonephritis	1
Systemic lupus erythematosus	2
Non-glomerular	
Post-operative	8
Benign prostatic hypertrophy	2
Urinary tract infection	13
Transitional cells carcinoma	2

blood cells glomerulopathy was confirmed by biopsy in 18 cases (Table II). In the remaining 2 patients no histological diagnosis was available.

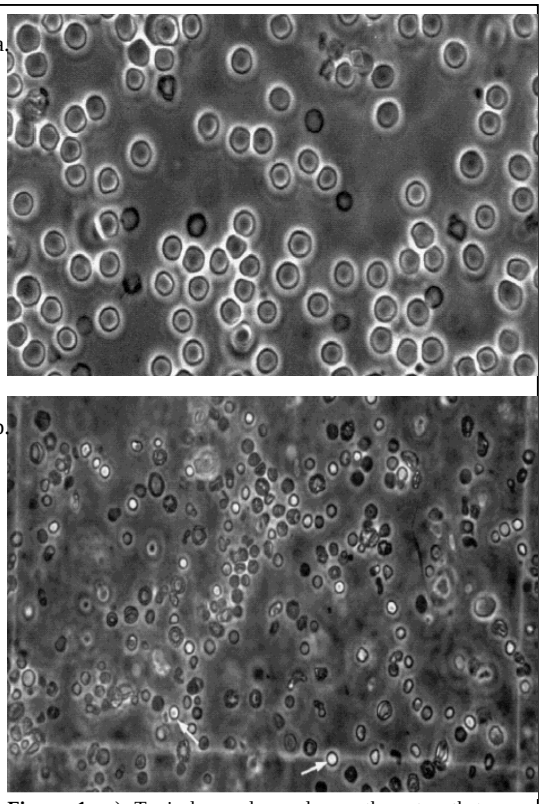

Figure 1: a) Typical nonglomerular erythrocytes that are uniform in size and shape but show 2 populations of cells because a small number have lost their hemoglobin pigment; b) Typical appearance of erythrocytes in glomerular hematuria in which cells are small and vary in size, shape, and hemoglobin content

Correlation of clinical/or histological findings with phase contrast microscopy in the 32 patients with less than 20% dysmorphic red blood cells confirmed the presence of a nonglomerular bleeding site in the urinary tract lesion in 25 of the remaining 7 patients, 2 had glomerulopathy and in 5 a definitive diagnosis was not made. This technique provides a sensitivity of 90% and specificity of 100% for the diagnosis of glomerular lesions.

Two patients with TCC had hematuria on phase contrast microscopy with less than 20% dysmorphic red blood cells.

This study showed that glomerular and non-glomerular bleeding can be differentiated with a high degree of accuracy by phase contrast microscopy of red blood cells. The presence of more than 20% dysmorphic red blood cells was diagnostic of a glomerular origin for the bleeding; if less than 20% dysmorphic red blood cells were present a non-glomerular origin for the bleeding should be suspected. A sensitivity of 90% and a specificity of 100% was achieved for this approach.

Table II: Correlation of phase contrast microscopy of urine sediment with clinical outcome

Disease	Findings of phase contrast microscopy	
	>20% dysmorphic RBC	<20% dysmorphic RBC
Histologically confirmed glomerulopathy	18	2
Non-glomerular lesion	0	25
Diagnosis unknown	0	5

Abdurrahman et al reported a sensitivity of 93% and specificity of 100%[3]. The slight improvement in sensitivity recorded by Abdurrahman et al may have been due to the fact that this group included a borderline category which they applied to those cases where the percentage of dysmorphic red blood cells was 15%-19%. Pillsworth et al found this technique slightly less specific than we did (94% and 100%)[4]. Their margin of decision was selected at more than 14% dysmorphic red blood cells which is slightly different from the one used in this study.

In a study performed by Fassett et at glomerulopathy was diagnosed only when dysmorphic red blood cells of more than 80% were found[8]. Thus a large group of patients with mixed dysmorphic and isomorphic red blood cells were excluded from the diagnostic process. This study included 18 patients with a mixture of dysmorphic

and isomorphic red blood cells. The range of dysmorphic red blood cells was from 20-50% in 8 patients and from 50-80% in 10 patients. In all 10 patients biopsy confirmed the presence of glomerulopathy. Theories have been proposed to explain the change in the morphology of the red blood cells in glomerular diseases. Dysmorphic changes may be due to mechanical deformation of red blood cells on passage through altered glomerular capillary clefts. They may be caused by pathological changes in osmotic pressure which modify the red blood cells membrane. The presence of toxic enzymes resulting from inflammatory processes has also been cited as a cause of dysmorphic red blood cells[10].

Pellet et all[10] used a red cell analyzer to determine the site of bleeding in patients with hematuria. The distinction was based on red cell volume and the results were compared with phase contrast microscopy. They found that the site of bleeding in patients with microscopic hematuria was more accurately identified by phase contrast microscopy than by the red cell analyzer[10]. We have noticed that the technique has the potential for the detection of dysmorphic red cells carred out at an early stage of investigation will help in avoiding unnecessary radiologic and urologic investigations in cases of hematuria of glomerular origin[8, 9, 10]. This may be the way forward for the wider application of this technique in clinical practice.

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Use of anthropometric indicators for predicting risk of delivering low birth weight babies

The birth weight of newborns is an important factor that affects the future survival and quality of life[1]. The importance of predicting the risk of delivering low birth weight (LBW) babies during pregnancy arises from the consistent relationship found between LBW and higher risk of mortality, morbidity, malnutrition and suboptimal growth and development[2]. In Bangladesh, incidence of LBW is unacceptably high[3]. To reduce the incidence of LBW in the country, a search for indicators of high risks of delivering LBW baby should be an important part of the antenatal care. From different studies, it is consistently observed that maternal anthropometric indicators are the established risk indicators for delivering LBW babies[4]. Early prediction of LBW babies from maternal anthropometric indicators will help policy makers, planners, program managers and service providers adopt appropriate intervention strategy for its (LBW) reduction. Thus, the objectives of the present study is to: (i) identify the most suitable anthropometric indicator(s) of risk of delivering LBW babies and (ii) select appropriate cut off point of the indicator(s).

This was an analytical cross-sectional study, conducted in a Government Maternity Hospital at Dhaka from January to May 1999. Anthropo-metric measurements [height, weight and mid upper arm circumference (MUAC) for mothers and birth weight for newborns] of 316 pregnant women and their newborns (singleton) were recorded according to standardized technique[5]. The detailed methodology is described elsewhere[6]. Chi-square test was under taken to observe the association

between discrete variables and LBW (data not shown). Multiple regression equation was carried out to find out the independent effect of different maternal factors on birth weight. Sensitivity and specificity analysis were undertaken to identify the suitable anthropometric risk indicator(s) for delivering LBW babies and to select cut off points for predicting risk women.

Significant positive effect of maternal height, weight, BMI and MUAC was observed on birth weight of newborns. For low maternal values of height, weight, BMI and MUAC (<145 cm, <40 kg, <18.5 and ≤21 cm) incidence of LBW were found to be 29.7,40.0, 30.0 and 33.3 percents respectively and for higher maternal values (≥160 cm, ≥60 kg, ≥25 and ≥27 cm) the corresponding incidences were 4.3, 4.4, 8.2 8.3 percents respectively. In stepwise multiple regression equation age, weight, height, MUAC, BMI, hemoglobin, gestational age, income and education were included as independent variables and birth weight of the newborn was considered as dependent variable. Maternal weight alone explained the variation of birth weight by 16% and weight together with gestational age explained the variation up to 24% (Table I). For predicting of delivering LBW babies, sensitivity, specificity analysis were carried out for different cut off points of maternal height, weight and MUAC (Table II).

Table I: Multiple regression equation for estimating birth weight from maternal factors

Multiple regression equation	Adjusted R square
Y = 187.30 + 20.7 weight	0.16
Y= - 821.57 +18.68 Wt + 70. 63 gestational age	0.24
Y = - 1221.69 + 17.14 Wt + 72.30 gestational age + 37.81 hemoglobin	0.25

Where Y= Birth weight

Anthropmetric parameters usually reflect past (for height) and current (weight and MUAC) nutritional status. Undernourished mothers in the present study as with other studies gave birth to significantly more LBW babies[6-9]. To undertake appropriate intervention strategy for prevention of LBW, prediction of risk indicator is necessary in early pregnancy and even before pregnancy. For early prediction, we are interested to risk indicators such as height, pre-pregnancy weight and MUAC. For convenience, in this study, post-partum weight was considered as proxy for pre-pregnancy weight. In sensitivity/specificity analysis, the best cut off point is one at which values for both the sensitivity and specificity are maximum. Thus, from Table II, it is revealed that for predicting risk women, suitable cut off points are 151 cm for height, 51 kg for post-partum weight and 24 cm for MUAC.

Now question arises, which anthropometric parameter will we use for early prediction of LBW babies and what will be the cut off point? At the field level, where MUAC can be measured with a measuring tape even by untrained persons, this parameter can be used to identify those women who will most likely deliver LBW babies. We recommend a cut off point of 24 cm for MUAC. Grass root level workers can screen the high-risk mothers with this simple tool and can refer to higher center for further screening. In health centers, where weighing scales/height-measuring equipments are available, we propose to use height or weight to screen the risk women. To identify higher risk mothers we can use height and weight at cut off points of 146 cm and 43.5 kg respectively

Table II: Sensitivity and specificity analysis for different cut offs of mothers anthropometric variables

Variable	Sensitivity %	Specificity %	Positive predictive value %	Negative predictive value %	Odds ratio	95% Confidence interval
Height (cm)						
<146.0	30.95	87.36	28.26	88.72	3.10	1.37-6.95
<151.0	61.90	62.07	20.80	91.01	2.66	1.30-5.49
<156.0	80.95	22.22	14.35	87.88	1.21	0.50-3.02
Post-partum weight (kg)						
<43.5	35.71	79.84	22.39	88.41	2.20	1.03-4.67
<51.0	78.57	45.35	18.97	92.86	3.04	1.33-7.15
<53.5	83.33	34.88	17.24	92.78	2.68	1.0.8-6.91
Mid upper arm circumference (cm)						
<22.0	14.58	88.06	17.95	85.20	1.26	0.47-3.24
<24.0	52.08	61.19	19.38	87.70	1.71	0.89-3.32
<26.0	72.92	38.43	17.50	88.79	1.68	0.89-3.52

and to identify at risk mothers, 151 cm and 51 kg can be used respectively for height and weight.

Canosa observed that all women whose post delivery weight was less than 41 kg had low birth weight infants[8]. Karim and Mascie-Taylor observed that weight at term provides more predictive power for LBW than MUAC and recommended a cut off point of 50 kg at term[9]. Attained height (except adolescent) cannot be modified by any intervention. However, advice for hospital delivery can be provided so that assisted delivery (if needed) can be ensured and proper care can be given to both mother and newborn. MUAC can be used for screening but not for monitoring purpose as its change is negligible during pregnancy. Pre-pregnancy weight is the most suitable anthropometric indicator for identifying risk women, because not only we can identify them, but also have ample of time to adopt appropriate interventions (food supplementation, nutrition, education etc) to increase the weight to a desirable level. Therefore, we conclude that pre-pregnancy weight or first trimester weight can be used as the best maternal anthropometric risk indicator (43.5 kg for higher risk and 51 kg for at risk women) for predicting women of delivering LBW babies.

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Outcome of 153 cases of mitral stenosis after percutenuous transvenous mitral commissurotomy

Rheumatic fever and rheumatic heart disease continue to be the major health problem in all developing countries including Bangladesh. The epidemiology of rheumatic fever/rheumatic heart disease constitutes 34% of total hospital admission of cardiovascular diseases in Bangladesh[1]. Its incidence is 26 percent and ranks second among all the cardiovascular disease in our country[2, 3]. Rheumatic mitral stenosis is a very common problem in our population having an incidence of 54 percent among rheumatic heart disease with a female preponderance of 2:1[4].

Population survey done during late 1980 in Bangladesh showed a prevalence of rheumatic fever/rheumatic heart diseases in a mixed population of 7.5 to 7.8 per thousand[2].

Despite the introduction of penicillin and improvement in the standard of living and delivery of primary healthcare, rheumatic mitral stenosis remains an important medical problem in the developing countries like Bangladesh.

The challenge of percutenuous catheter based treatment of rheumatic mitral valve stenosis is to provide not only effective treatment but also equal or greater safety compared to close or open surgical commissurotomy which carries an operative mortality of 1-3 percent. The efficacy of percutenuous balloon commissurotomy for rheumatic valvular heart disease has recently been shown to be as effective as surgical commissurotomy in randomized studies[5,6].

Badiuzzaman examined the immediate and short term follow-up results of percutaneous transvenous mitral commissurotomy in Bangladeshi patients[7]. One hundred nine patients underwent percutaneous transvenous mitral commissurotomy and it was observed that total mitral valve score was strongly associated with post-percutaneous transvenous mitral commissurotomy outcome in terms of decrease in mean pressure gradient (MPG),

increase in mitral valve area and occurrence of mitral regurgitation.

Chowdhury[8] carried out a comparative study between percutaneous transvenous mitral commissurotomy and close mitral commissurotomy. Wilkins score and total commissural morphology score were found to be the most important procedural variables associated with the outcome. There is also observed that immediate outcome after percutaneous transvenous mitral commissurotomy and close mitral commissurotomy were excellent but there was no significant difference in terms of outcome between the two procedures.

From January to December 2003, 153 cases underwent the percutaneous transvenous mitral commissurotomy with moderate to severe mitral stenosis using the inoue balloon catheter in the National Institute of Cardiovascular Diseases and Hospital (NICVD), Dhaka, Bangladesh. Patients were included in this study if they fulfill the following criteria: mitral valve areas <1.5 cm^2, absence of more than Grade II mitral regurgitation, absence of significant calcification or subvalvular change and absence of left atrial thrombus.

Two dimensional, M-mode, spectral and color doppler studies were done in all patients both before and after percutaneous transvenous mitral commissurotomy. After taking written consent, right and left cardiac catheterization was done. Trans-septal puncture was done by Brocken Brough needle and Mullin sheath. The optimal size of the inoue balloon was decided by mathematical formula [height (in cm)/ 10 + 10]. Stepwise or graded dilatation was done. Pulmonary artery systolic pressure, left atrial means pressure and mean transmitral pressure gradient were recorded before and immediately after the mitral valve dilatation. Results were considered optimal when the increase in mitral valve area ≥1.5 cm^2 or percentage increase was ≥50% and mitral regurgitation was grade ≤2.

Among 153 cases two patients develop mitral regurgitation grade III which were medically treated and no surgical intervention needed. One patient developed moderate hemopericardium and procedure was stopped and treated conservatively. Later the patient's percutaneous transvenous mitral commissurotomy done successfully.

The procedure was successfully performed in 150 cases out of 153 (98%) cases. Technical failure occurred in one case due to inability to cross the mitral valve and two cases developed mitral regurgitation Grade III which was treated medically and one case developed moderate hemopericardium.

There were 98 females and 55 males with mean age of 36 ± 15.34. Thirty four (22%) had atrial fibrillation, 25 (16%) had previous commissurotomy (Table I). 80 (52%) had Grade I-II and 73 (48%) grade III-IV NYHA functional class dyspnea and total echocardiographic (Wilkin's) score was in the range 5-10. Mean (± SD) of total score was 6.75 ± 0.80. Left atrial diameter, 43.35 ± 6.80 mm and had also mitral regurgitation Grade I-II, 25 (16%).

Table I: Basic characteristics of the patients

Age (years) (mean ± SD)	36 ± 15
Age (years) range	12 - 60
No. of female patients	98 (64%)
NYHA class	
1-2	80 (52%)
3-4	73 (48%)
Atrial fibrillation	34 (22%)
Previous commissurotomy	25 (16%)
Echocardiographic score	6.75 ± 0.80
Echocardiographic Range	5 - 10
Left atrium diameter (mm)	43.35 ± 6.80
Associated mitral regurgitation (grade I or II)	25 (16%)

All the data expressed as (mean±SD), range, percentage as applicable

Mean mitral valve area was 0.79 ± 0.18 cm^2. Post percutenuous transvenous mitral commissurotomy, mitral valve area was 1.86 ± 0.37 cm^2. Statistically significant increased in valve area ($p<0.001$). Post percutaneous transvenous mitral commissurotomy valve area increase more in those patient had Wilkins score 5 - 7.

Mean peak pressure gradient was found 15 ± 4.72 mm Hg. After percutenuous transvenous mitral commissurotomy pressure gradient across the mitral valve decreased to a mean 8.70 ± 3.83 mm Hg (p- 0.004).

Mean pressure gradient decreased significantly. It was 19.60 ± 8.94 mm Hg before the procedure and 3.72 ± 3.82 mm Hg after the procedure (p value- 0.001).

Pulmonary artery systolic pressure decreased significantly after the procedure. PASP (mean ± SD) was 56 ± 24 mm Hg before percutaneous transvenous mitral commissurotomy. After percu-

Table II: Pre- and post-percutenuous transvenous mitral commissurotomy hemodynamic results

	Before PTMC	After PTMC	P value
Pulmonary artery systolic pressure mm Hg (PASP)	56 ± 24	39 ± 17	0.002*
Mean left atrial pressure	41.33 ± 9.31	30.56 ± 8.16	0.0001***
Peak pressure gradient (PPG)	15 ± 4.72	8.70 ± 3.83	0.004*
Mean pressure gradient	19.60 ± 8.94	3.72 ± 3.82	0.001***
Mitral valve area (cm^2) planimetry	0.79 ± 0.18	1.86 ± 0.37	0.001***

All the data expressed as (mean±SD); PTMC= percutaneous transluminal commissurotomy; ns= nonsignificant; *= significance at 0.05, ***= significance at 0.001

percutaneous transvenous mitral commissurotomy it become 39 ± 17 mm Hg. It was measured 3 days after the procedure (p value- 0.002).

Patients follow up immediate after the procedures stated to have significant improvement of their symptoms especially of undue fatigue, exertional dyspnea and palpitation. More than 90% patients had NYHA functional class decreased by at least Grade I. All were assess 3 days after the procedure.

The present study documents the safety and effective hemodynamic effects of transvenous mitral commissurotomy study results were better than previous studies reported on the Inoue technique[9-12]. Percutenuous transvenous mitral commissurotomy is alternatives to surgical commissurotomy for the treatment of selected patients with rheumatic mitral stenosis.

In our study series there was no emergency mitral valve replacement or closed mitral commisurotomy or open mitral commisurotomy or significant atrial septal defect. So, immediate outcome after percutaneous transvenous mitral commissurotomy was excellent.

Total Wilkins score, total commissural morphology and calcification were found to be the most important pre-procedure variable associated with the outcome.

In conclusion, percutenuous transvenous balloon mitral commissurotomy is an alternative to closed mitral commissurotomy and intervention of choice of symptomatic rheumatic mitral stenosis with suitable mitral valve morphology.

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Prevalence of overweight and obesity in infancy

Obesity and overweight is a worldwide problem. Recent surveys from National Health and Nutrition Examination Survey (NHANES) have shown that prevalence of overweight increased from 5% to 13.9% for those aged 2-5 years; 6.5 to18.8% for ages 6-11 years[1]. Similarly, obesity level in South Australia has jumped by more than 8% since 1993 with one in five young children are overweight or obese. In Britain the prevalence of obesity in children aged under 11 years has reported to be increased from 9.9% in 1993 to 13.7% in 2003[2]. Furthermore, 9,000 premature death per year are reported to be due to obesity and considered to be alarming in England[3].

Generally being overweight or obese increases the risk of many diseases and health conditions such as coronary heart disease, hypertension, hyperlipidemia, diabetes, stroke, gall bladder disease, osteoarthritis, sleep apnea, respiratory problem and so on.

It is true that obese or overweight babies are pretty looking, but their life is going to be hazardous. Not all obese infants become obese and not all obese children become obese adult. However, obesity at early childhood will persist throughout the life span of an individual[4.]

There is no study has been under taken on the prevalence of obesity and overweight in infancy in Bangladesh where undernutrition is a problem and overweight is ignored in infancy. Therefore, this study was undertaken to investigate the incidence of obesity and overweight in infants in a local hospital at Dhaka which has reputation for treating malnourished children coming from under privileged and low income population.

Number of babies included were 172 (116 males and 56 females) with age group 1-12 months.

Inclusion criteria were weight for height >100%, double chin appearance and abdominal tires.

Hanging scale, stadiometer, calculator, WHO Body mass index (BMI) from birth to two years were used as tools.

For each baby, age, sex, feeding history length/height, weight, weight for height (weight of the baby divided by ideal weight for height then percentage was calculated) and BMI (weight/height in M^2) were taken then plotted in WHO BMI centile chart. For the purpose of study obesity was considered when the BMI >97% and over weight is >85% of BMI[5].

Among study group obese was 24 (14%), over weight was 44 (25.6%) and normal was 104 (60.5%). Male babies were more obese (n=17) than females (n=7), and overweight male was 30, female was 14. Breast fed was 72 (41.9%), mixed fed was 100 (58.1%).

This study demonstrates that the prevalence of obesity and over weight in infants is 14% and 26% respectively. The contributing factors of obesity are prevailing. One of the contributing factors is: Improper idea or health image of parents plus guilty feeling of some parents of non-providing of quality foods despite them are giving adequate food.

The magnitude of obesity is going to increase in future due to unplanned rapid urbanization, small school houses, lack of play ground and insecure play ground, home entertainment like television watching and video games, excessive home work or extra coaching after school hour.

World Health Organization launches a new global Child Growth Standards for infants and children up to age of five years. They demonstrate for the first time ever that children born in different regions of the world and the optimum start of life have the potential to grow and develop to within the same range of height and weight for age. WHO has standardized BMI charts for infants to age five years, which is particularly useful for monitoring the increasing epidemic of childhood obesity.

BMI has been recommended as the best measurement for monitoring overweight in individuals in the pediatric population[5, 6]. Several studies have reported a good relation between BMI and fatness of childhood[6, 7]. The convenience of measuring BMI has understandably made it popular with both pediatric clinicians and epidemiologist[8]. BMI and BMI gain in infancy were correlated more strongly with adult lean mass than with adiposity or central adiposity. Higher BMI and greater BMI gain in late childhood and adolescence were associated with increased adult adiposity and central adiposity[9].

Obesity is an excess of body fat, not an excess of body weight. The continued emphasis on BMI for routine assessment will help to detect more obese infant for early intervention. Obesity related problem is still not a major problem for Bangladesh but attention must be there.

The study concluded that the global problem of obesity is still not yet significantly affected the infants of non affluent society in Bangladesh.

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