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   b. When seven or more, list the first three and then add et al; Parkin DM, Clayton D, Black RJ et al. Childhood leukemia in Europe after Chernobyl 5-year follow-up. BR J Cancer 1996; 73 : 1006-12.
   c. No author given
   d. Organization as author
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   b. Editor(s), (s) as author
   c. Organization as author and publisher
   d. Chapter in a book
   e. Dissertation
3. Other published material
   a. Newspaper article
   b. Dictionary and similar references
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The HOW of Sustainable Blood Safety in Bangladesh

Blood Transfusion is a vital component of every country’s health care delivery system. It can be a life-saving intervention, but it may also result in acute or delayed complications and carries the risk of the transmission of infections. Between 5% and 10% of HIV infections worldwide are transmitted through the transfusion of infected blood and blood products. Many more recipients of blood products are infected by hepatitis B and C viruses, syphilis and Malaria. Despite all the technological marvels that humanity is experiencing, a reliable and safe Blood supply, is still out of reach for the untold millions of peoples because of the following lackings:

1. Low priority given to Blood safety by the National Health Authority.
2. Chronic shortages of VBDs as the source of safe Blood.
3. Absence of QMTs in the BTCs.
4. Recourse of PDs as FDs and/or RDs.
5. Lack of awareness of CUB by Physicians.
6. Social culture/stigma yet not to be as compatible with Blood safety.

The main reason for starting AVD is to ensure self-sufficiency in Blood/Products from voluntary, anonymous and non-remunerated, regular Donors in accordance with the recommendations of WHO. In the past strategies to promote blood safety tended to focus primarily on screening of donated blood for transfusion transmissible infections (TTIs). However while systematic screening is essential it is insufficient in itself to ensure the safety of the blood supply.

Evidence from all regions of the world indicates that the absence of a nationally coordinated blood programme, lack of safe blood donors and the unnecessary clinical use of transfusion are equally important contributory factors to the transmission of infection by transfusion.

The WHO strategy for blood safety emphasizes an integrated four fold approach. Effective quality assurance should form an essential part of this approach:

1. The establishment of a coordinated blood transfusion service that can provide adequate and timely supplies of safe blood for all patients in need.
2. The collection of blood only from voluntary non remunerated blood donors from low risk populations and the use of stringent donor selection procedures.
3. The screening of all donated blood for transfusion transmissible infections, including HIV, hepatitis viruses, syphilis and other infectious agents, and blood grouping compatibility testing and processing of blood.
4. Reduction in unnecessary Transfusion through appropriate CUB including use of alternative I/V fluids to Transfusion wherever possible.

In developed countries, the blood supply comes from voluntary non-remunerated blood donors. Globally, developing countries contribute only 16% of the voluntary non-remunerated blood donors which shows that the blood supply depends on a very high proportion of family/replacement/paid donors in these countries. Voluntary non-remunerated blood donors are at significantly lower risk for transfusion-transmissible infections than family/replacement donors and paid donors. In addition, many transfusions are clinically unnecessary, providing little or no benefit to the patients who received them and wasting a scarce resource that may result in a shortage of blood products for patients in real need.

Eleven Proposals For a Sustainable Safe Blood Transfusion Service:

1. Formalization of government commitment and support
2. Development of a national blood policy and plan
3. Development of necessary legislation/regulation
4. Formation of an organization with responsibility and authority for the BTS
5. Formation of a BTS management committee
6. Appointment of a medical director
7. Appointment of a quality manager
8. Appointment, when necessary of specialist BTS advisory groups
9. Appointment and raining of staff experienced in each key aspect of the BTS
10. Development and implementation of a budgeting and finance system to ensure a sustainable blood programme through cost recovery and / or annual budget allocation
11. Establishment of national quality system, including guidelines, standard operating procedures (SOPs), accurate records, monitoring and evaluation.

Prof. Dr. Munshi M. Habibullah
Professor of Blood Transfusion
Original Articles

Photo-anthropometric Study of Nasal Breadth Among Tribal (Garo) and Non-Tribal Adult Bangladeshi female of greater Mymensingh Districts

Israt Jahan Tania1, Humaira Naushaba2, Fahmida Zaman3, Kohinur Sultana4, Zinat Rezina Sultana5

Abstract

Background: Anthropometry is a series of systematized measuring techniques that expresses quantitatively the dimensions of the human body and skeleton which play an important role in distinguishing a pure race. It provides quantitative data in identifying people having different physical characteristics in diagnosing people having craniofacial abnormality and to compare between patient and normal population. The nose is a person’s most defining feature because it is at the center of the face. The shape of the nose differs from race to race, tribe to tribe and from one environmental region of the world to the other.

Materials & Methods: Cross sectional analytical study was conducted in the department of Anatomy, Sir Salimullah Medical College, Dhaka, from January 2015 to December 2015. The study subjects consisted of two hundred (200) adult Bangladeshi female of greater Mymensingh districts among them, 100 were tribal (Garo) female and 100 non-tribal female.

Results: The mean (±SD) nasal breadth from ‘ala to ala’ was higher in tribal(Garo) female than non-tribal female (p<0.001).

Conclusion: Nasal breadth from ‘ala to ala’, was higher in tribal(Garo) female compared to non-tribal female.

Key words: photo - anthropometry, nasal breadth, tribal (Garo) female, non-tribal female, greater Mymensingh districts.

(Sir Salimullah Med Coll J 2018; 26: 3-6)

Introduction

The word anthropometry comes (from Greek anthropos, ‘man’ and metron, ‘measure’). Photo-anthropometry is the process of obtaining measurements by mean of photographs. Digital photographic techniques potentially offer a highly practical, convenient and cost effective method. The reliability of the photographic technique is satisfactory. 2D digitilization method is accurate and can be applied for both clinical practice and research. In digital photography, there is no need to locate landmarks prior to image taking1. Another advantage of digital photography is the opportunity to preserve the material, which allows to repeat the measurements anytime and to add new parameters in later measurements.

Variation is one of the most important phenomenon occurring in human population on the globe. Anthropometry is the hallmark technique that deals with the study of body proportion and absolute dimensions and vary with age and sex within and between racial groups. The dimensions of human body are affected by ecological, biological, geographical, racial, personality, body habitus, age factors and gender2.

Growth and development of craniofacial structures are important as many clinical disciplines depend on it for understanding their processes for diagnosis,

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timing and planning of treatment. The knowledge of nasal measurement is important to clinicians such as reconstruction of rhinoplasty and craniofacial surgeons enabling them in detection of normal or abnormal changes, assistance in diagnosis and planning of treatment\(^3\). It is also important in forensic science. The normal values of nasal parameters are vital measurements in the evaluation and diagnosis of craniofacial deformities\(^4\).

Populations vary genetically and geographically in their craniofacial features. Therefore, a single standard of anthropometric variable is not appropriate for being applied to diverse racial and ethnic groups. Though Bangladesh is a relatively small country, people of different religions and ethnic groups live here and these different groups have differences in their physical characteristics. There are as many as 30 tribal communities living in different parts of Bangladesh. The Garos are one of them. The total population of Garos residing in Bangladesh are approximately two lacs and sixty four thousands. They mostly live in Mymensingh, Sherpur, Tangail, Sylhet and Sunamgonj districts of our country. Out of them two lacs Garos are found in Mymensingh district of Bangladesh. The Garos are an ethnic group of ‘Tibbeti Borman’, belonging to the Mongolian human race\(^5\).

The face of the tribal(Garo) are round with deep eyebrows, small black eyes, flat nose and high jaws. In Bangladesh, studies on craniofacial measurements are limited to mostly on tribal population. Also there is very few comparative study between tribal (Garo) and non-tribal Bangladeshi female. It will be useful for researchers, clinicians and forensic experts in respect to their field of study.

**Materials and Methods**

The study was performed on one hundred were adult tribal( Garo) female and one hundred non-tribal Bangladeshi female age ranging from 25 to 45 years of greater Mymensingh district. Date of birth of each subject was recorded from their national identity cards. Bangladeshi female who were mixed in origin- a history of marriage between tribal and non-tribal people or with any other tribes within the last three generations-prior history of oculofacial trauma, congenital craniofacial anomaly (ie; cleft lip, cleft palate), post traumatic deformities that might affect craniofacial measurements were excluded from the study.

Before going to the measurement procedure each of the subject was greeted politely. Then her national identity card was checked to confirm her age. After a short briefing on the objective of the present study, the subject was asked to give a voluntary consent on the consent form. Each subject was made seated comfortably on a chair. The digital camera was fixed on its stand at the same level of the subject’s head having a distance of 120 centimeter between the two. The face of each study subject was well illuminated and photograph was taken keeping the study subject looking straight to the camera, both eyes opened and mouth closed. Then the photograph of the subject was uploaded in the computer having program named Adobe Photoshop Version-8 and Adobe Illustrator Version-11. Nasal breadth was taken as the horizontal distance between the outer surfaces of two ala of the nose\(^6\).

After collecting the data, the data was checked and edited. Later the data was statistically analyzed by a software package, SPSS for Windows (version 7.0).

**Fig.-1:** Showing photographic measurement of nasal breadth (al-al), al-rt (red dot) indicates right ala, al-lft(blue dot) indicates left ala.

Statistical tests such as unpaired Student’s’\(t\) test was done.

Statistical significance was accepted at p-value equal to or less than 0.05 (p<0.05).

**Ethical clearance:**
The study was carried out after the protocol was
Table 1
Nasal breadth of the study subjects

<table>
<thead>
<tr>
<th>Nasal breadth in cm (n=100 in each group)</th>
<th>Mean±SD</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tribal (Garo) female</td>
<td>3.62±0.60 (2.62 4.92)</td>
<td>0.0001***</td>
</tr>
<tr>
<td>Non tribal female</td>
<td>3.00±0.31 (2.30 3.90)</td>
<td></td>
</tr>
</tbody>
</table>

Fig.-2: Nasal Breadth of the study subjects

Discussion:
It has widely been recognized that craniofacial anthropometry is affected by geographical, racial, ethnical, gender and age factors. So each population should have specific standards to optimize the accuracy of identification.

Conclusion
The study revealed that the significant (p<0.001) difference was found between tribal female (Garo) and non-tribal female in nasal breadth from ‘ala to ‘ala’. In this study some comparisons were made with other populations. This type of study might help to understand the relative status of Garo

Results:
Results of the study are expressed in Table I and Fig. 1 & 2.

The selection of study area was on the basis of density of tribal population and was considered on the basis of same socioeconomic and nutritional status. It is understandable that the economic status is likely to influence the nutritional status of an individual and thereby may affect the facial dimensions. To minimize the possible effect of economic condition on the anthropometric data, female of broadly the same economic status were chosen for the present study.

The findings of the present study were compared with the findings of other researchers where female of Nepal, Japan, China, India (West Bengal, Rajasthan, Andaman) were included. They are Mongoloid by race. Similarity and dissimilarity have been found with the findings of other researchers. As Bangladeshi tribal (Garo) belonged to Mongoloid and non-tribal female are mixture of Austric, Indo-Aryan, Mongoloid and Dravidian so, it is understood that Bangladeshi people has contribution from more than one race and there are wide variations in their physical features.

Choe et al. (2006) worked on Korean American female and the mean value of nasal breadth was not significant (p>0.05) when compared to the findings of the present study on tribal female. Mostafa (2013) conducted a study on adult Bangladeshi Buddhist Chakma female of mixed race and significant (p<0.01) difference was found when compared with the findings of the present study. On non-tribal female Farkas et al. (2005) carried out a study on Indian, Chinese of Singaporean, Vietnamese, Thai and Japanese. On comparison with the findings of the present study on tribal and non-tribal female the mean value of nasal breadth in Indian, Chinese of Singaporean, Vietnamese and Japanese were similar but Thai female had significant (p<0.01) difference when compared with the findings of the present study on tribal female.
population in the context of the anthropometric variations around the world, especially among the Mongoloid population.

References:
Prevalence and Risk Factors Affecting Low Birth Weight in a Tertiary Level Hospital of Dhaka City
Fahmida Haque¹, Mahbuba Akhter Banu², S.F. Nargis³, Nilufa Nasrin (Ava)²

Abstract

Background: Low birth is one of the major health problems worldwide. The management of children with LBW is not the same in countries with different resources. It is closely related to neonatal mortality and morbidity, may cause growth and developmental delay and may result in chronic ill health in adult life. Many factors affect intrauterine fetal growth and thus the birth weight. It is important to identify the factors that play a role in the occurrence of this adverse pregnancy outcome. The present study is conducted to assess the prevalence and to explore the associated risk factors of term LBW that will helpful to address effective measure to reduce the incidence of LBW babies.

Methods: The study was conducted at SSMC and MH during the period of Jan 2017 to Dec 2017. A sample size of 300 term live birth over a period of 6 months were analyzed. The women who delivered the term baby were enrolled in the study according to selection criteria and information regarding maternal age, weight gain during pregnancy, parity, income of family, gestational age, maternal occupation, degree of literacy, birth interval was collected. Birth weight was recorded within 6 hrs of delivery. The statistical analysis was done by SPSS-22.

Results: Sample size 300 was calculated by taking 25% as the minimum prevalence of low birth weight with 20% permissible error. The prevalence of LBW was found as 11.67% in 300 mothers. Significant association was found between Low birth weight and weight gain in pregnancy.

Conclusion: Though the prevalence of LBW is lower than national level, it is the need of the hour to strengthen the existing maternal services at the basic level of community to improve the birth weight of neonate.

Keywords: Low birth weight, risk factors, prevalence.

(Sir Salimullah Med Coll J 2018; 26: 7-11)

Introduction

Babies with a birth weight of less than 2500gm, irrespective of the period of their gestation are termed as Low Birth Weight (LBW) babies.¹ It is an important factor to determine whether child is ready to adjust his surroundings.² It leads to inhibited growth, cognitive development and also associated with chronic diseases later in life.³

In Bangladesh the proportion of LBW babies was 25.49%. The most of the LBW babies (30.77%) were identified in low income group.⁴ In 2011, Indian Statistical Institute reported nearly 20% of new born have LBW in India.⁵ The perinatal mortality among LBW infants is about eight times higher than that in infants weighing more than 2.5kg.⁶

The low birth weight is an index of our status of public health, maternal health and nutrition in particular. The major challenge in the field of public health is to identify the factors influencing low birth weight and to institute remedial measures.⁷ LBW is a multi-faceted problem with some known and few unknown reasons. The etiology of LBW is also complex with demographic, nutritional, reproductive, and socio-economic factors each potentially playing a role. These causes can be enlisted as maternal Hemoglobin (Hb) level, hard manual work during antenatal period, maternal nutrition, economic condition, antenatal care, parent’s education, tobacco use, maternal age, and parity.⁸

Hence, this study was conducted to know the prevalence and to identify risk factors affecting low birth weight in this hospital.

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Materials and Methods
The present cross sectional hospital based study was conducted in a tertiary level hospital from Jan 2017 to Dec 2017. The sample size 300 was calculated taking minimum 25% prevalence of low birth weight with 20% permissible error. All 300 postnatal mothers who delivered term baby in the hospital during study period were included in the study except still births. They were interviewed using predesigned and pretested questionnaires and the information regarding the study variables were collected after obtaining consent.

The birth weight of child was measured in grams within six hours after delivery using pre-calibrated Salter weighing machine (UNICEF). Birth weight less than 2500 gm was used to label a child as LBW. Mother’s height was measured up to the accuracy of 0.5 cm and weight was recorded up to the accuracy of 0.5 kg.

The socio-demographic variables were addressed such as mothers age in years, mother’s education, husband’s education with occupation, per capita income, type of family, area of living, parity. Other variables were height of mother in cm, weight gain during pregnancy, any eventful antenatal period, hard physical work during pregnancy, current type of delivery, previous type of delivery, previous child birth weight in kg.

Data was processed by using software SPSS-22. The information was analyzed by appropriate statistical tests. Results were expressed in percentages, odds ratios, 95% confidence interval of odds ratio and chi square tests (\(\chi^2\)). The p value less than 0.05 were taken as statistically significant.

Results
The prevalence of Low birth weight in this study was found as 11.67%. LBW babies were found in 2(8.33%) mothers with age less than 20 years. There were 33(94.29%) literate mothers and 34(97.14%) literate fathers with LBW babies. The family of 25.41% mothers with LBW babies had per capita income less than 15000 Tk. In nuclear type of family, there were 12(34.29%) LBW babies whereas 23(65.71%) babies in joint and three generation type of families. The proportion of LBW babies were more in mothers from rural area (71.43%) than urban area (2.86%).

The socio-demographic variables such as maternal age less than 20 years, husband education, per capita income less than 15000 Tk, type of family and residence of the mother, had no significant association but illiterate mother had significant association with low birth weight (Table-1).

Table - I
Distribution of Low Birth Weight babies according to socio-demographic variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>LBW n=35</th>
<th>Normal Birth n=265</th>
<th>Odds Ratio (95% confidence interval)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mothers age in years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below 20</td>
<td>2(8.33)</td>
<td>22(91.67)</td>
<td>0.67(0.10-2.60)</td>
<td>0.90</td>
</tr>
<tr>
<td>Above 20</td>
<td>33(11.96)</td>
<td>243(88.04)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mothers Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>23(22.8)</td>
<td>78(77.2)</td>
<td>4.59(2.18-9.62)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Literate</td>
<td>12(6.0)</td>
<td>187(94.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Husband Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>1(7.14)</td>
<td>13(92.86)</td>
<td>0.57(0.07-4.50)</td>
<td>0.59</td>
</tr>
<tr>
<td>Literate</td>
<td>34(11.89)</td>
<td>252(88.11)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monthly income</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 15000</td>
<td>9(12.50)</td>
<td>63(23.77)</td>
<td>1.11(0.49-0.06)</td>
<td>0.80</td>
</tr>
<tr>
<td>More than 15000</td>
<td>26(11.40)</td>
<td>202(88.60)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of family</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nuclear</td>
<td>12(10.00)</td>
<td>108(90.00)</td>
<td>0.76(0.36-1.59)</td>
<td>0.46</td>
</tr>
<tr>
<td>Joint &amp; three gen.</td>
<td>23(12.78)</td>
<td>157(87.22)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area of living</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>10(12.99)</td>
<td>67(87.01)</td>
<td>1.18(0.54-2.59)</td>
<td>0.68</td>
</tr>
<tr>
<td>Rural</td>
<td>25(11.21)</td>
<td>198(88.79)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Birth interval within 2 years (59.1%), irregular iron folic acid intake (18.9%) and hard physical work during pregnancy (7.4%) had significant association with low birth weight babies (p<0.05). Parity, antenatal checkup and any eventful antenatal period were not significantly associated with LBW babies (Table-II).

LBW was not significantly associated with 7(18.92%) in mothers who was less than 145 cm, mothers, weight gain during pregnancy less than 12 kg 9(33.33%) was significant association with low birth weight babies (Table-III).

Twenty four (28.6%) mothers who were already given births to LBW babies in previous deliveries had again LBW babies in current delivery, which is significant association with LBW babies. There were 4(11.76%) LBW babies whose delivery was conducted by caesarean section, which is not statistically significant association with LBW babies (Table-IV).

### Table-II

**Distribution of Low Birth Weight babies according to obstetric history**

<table>
<thead>
<tr>
<th>Variables</th>
<th>LBW n=35 No(%)</th>
<th>Normal Birth n=265 No(%)</th>
<th>Odds Ratio (95% confidence interval)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primigravida</td>
<td>18(11.32)</td>
<td>141(88.68)</td>
<td>0.93(0.46-1.89)</td>
<td>0.84</td>
</tr>
<tr>
<td>Multigravida</td>
<td>17(12.06)</td>
<td>124(87.94)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth interval (yrs) (n=141)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 2 years</td>
<td>13(59.1)</td>
<td>9(40.9)</td>
<td>41.5(11.2-153.9)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>&gt; 2 years</td>
<td>4(3.4)</td>
<td>115(96.6)</td>
<td></td>
<td></td>
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<tr>
<td>Antenatal checkups</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;3 visits</td>
<td>18(11.32)</td>
<td>141(88.68)</td>
<td>0.93(0.46-1.89)</td>
<td>0.84</td>
</tr>
<tr>
<td>&gt; 3 visits</td>
<td>17(12.06)</td>
<td>124(87.94)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any eventful antenatal period</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>16(11.6)</td>
<td>122(88.4)</td>
<td>0.99(0.46-2.11)</td>
<td>0.971</td>
</tr>
<tr>
<td>No</td>
<td>19(11.7)</td>
<td>143(88.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron folic acid intake</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular</td>
<td>14(7.4)</td>
<td>175(92.6)</td>
<td>0.34(0.16-0.75)</td>
<td>0.003*</td>
</tr>
<tr>
<td>Irregular</td>
<td>21(18.9)</td>
<td>90(81.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hard physical work during pregnancy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>23(7.4)</td>
<td>114(92.6)</td>
<td>2.54(1.15-5.68)</td>
<td>0.011*</td>
</tr>
<tr>
<td>No</td>
<td>12(18.9)</td>
<td>151(81.1)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table-III

**Distribution of low birth weight babies according to maternal anthropometry and other risk factors**

<table>
<thead>
<tr>
<th>Variables</th>
<th>LBW n=35 No(%)</th>
<th>Normal Birth n=265 No(%)</th>
<th>Odds Ratio (95% confidence interval)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height of mother (cm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 145</td>
<td>7(18.92)</td>
<td>30(81.08)</td>
<td>1.96(0.79-4.87)</td>
<td>0.14</td>
</tr>
<tr>
<td>&gt;145</td>
<td>28(10.65)</td>
<td>235(89.35)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight gain during pregnancy (kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less Than 12</td>
<td>9(33.33)</td>
<td>18(66.67)</td>
<td>4.75(1.93-11.64)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>More Than 12</td>
<td>26(9.52)</td>
<td>247(90.48)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Discussion

The proportion of Low Birth Weight in the present study was 11.67% while it was 21.5% from NFHS-3 data. A similar prevalence was found in study by Mumbare et al. and Sharma et al. The variation in the prevalence may be due to varying geographic and socioeconomic differences among the different communities. The LBW was 8.33% among mothers less than 20 years of age which was lower than study by Anand et al. young age of mother and inadequate development of uterus can cause low birth weight babies. In present study, the proportion of LBW was found significant association with illiterate women (22.8%). Rizvi et al and Mavalankar et al. showed significant association between maternal education and LBW. The less prevalence of low birth weight in relation to illiteracy may be linked to awareness regarding the need for antenatal care services and their utilization. High proportion of low birth weight was found in less than 15000 tk. per capita income (12.5%). There was no statistical significant association between LBW and family income. High prevalence of LBW in joint family status have also reported in other study. In present study, the proportion of low birth weight was 11.21% among those mothers residing in rural area whereas it was 28% in study by Swarnalatha N. In the present study, low birth weight was 11.32% in primipara. The study by Acharya et al reported that significant association of low birth weight with prim parity. Proportion of LBW was high among those mothers with narrow birth interval of less than 2 years (59.1%). Similar finding was revealed by the study conducted in Joshi et al. This may be due to mothers cannot recover from the effect of last pregnancy before conceiving again and her nutritional status deteriorates with subsequent pregnancies. Hence the birth spacing more than 2 years in preventing LBW babies is important.

The proportion of LBW was high among mothers who had less than 3 required antenatal checkups indicating as a determinant of LBW. Idris et al also published the similar findings in their study. This may be due to noncompliance of advice/drugs during antenatal period. This emphasizes the need to improve both the coverage and quality of ante-natal care to reduce LBW. The consumption of regular iron and folic acid (IFA) were found in mothers with 7.4% LBW babies. Therefore efforts should be made to provide regular supplementation of iron and dietary modification.

The prevalence of low birth weight was found to be high in women engaged in hard physical work in pregnancy (7.4%). A hard physical works during pregnancy will lead to early onset of labor causing prematurity.

In Table-IV LBW according to maternal anthropometry and other risk factors shows the proportion of low birth weight (18.92%) was found to be high among those women with height >145 cm. Trivedi et al reported a significant association between maternal height and low birth weight. The prevalence of low birth weight was found to be high in women with less than 12 kg weight gain during pregnancy (33.33%). Significant relationship was found between maternal weight gain during pregnancy and LBW in a study by Kamaladoss. Hence it is recommended to improve the nutritional status of a girl child throughout her life cycle as it will improve the nutritional status of women and will reduce the problem of LBW.

<table>
<thead>
<tr>
<th>Variables</th>
<th>LBW n=35</th>
<th>Normal Birth n=265</th>
<th>Odds Ratio (95% confidence interval)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status of previous births</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LBW</td>
<td>24(25.5)</td>
<td>70(74.5)</td>
<td>6.08(2.68-14.0)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Normal birth weight</td>
<td>11(5.3)</td>
<td>195(94.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous delivery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caesarean</td>
<td>4(11.76)</td>
<td>30(88.24)</td>
<td>1.01(0.33-3.06)</td>
<td>0.985</td>
</tr>
<tr>
<td>Normal</td>
<td>31(11.65)</td>
<td>235(88.35)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table-IV
Relationship of low birth weight babies with previous pregnancy

In Table-IV LBW according to maternal anthropometry and other risk factors shows the proportion of low birth weight (18.92%) was found to be high among those women with height >145 cm. Trivedi et al reported a significant association between maternal height and low birth weight. The prevalence of low birth weight was found to be high in women with less than 12 kg weight gain during pregnancy (33.33%). Significant relationship was found between maternal weight gain during pregnancy and LBW in a study by Kamaladoss. Hence it is recommended to improve the nutritional status of a girl child throughout her life cycle as it will improve the nutritional status of women and will reduce the problem of LBW.
Conclusion
Though the prevalence of LBW is lower than national level, it is the need of the hour to strengthen the existing maternal services at the basic level of community i.e., at door steps of the beneficiaries. Inter pregnancy interval may be improved through different contraceptive methods of spacing. Good pregnancy care including intake of iron and folic acid, rest of the mother during pregnancy to improve maternal weight gain during pregnancy to increase the birth of neonate is necessity. Those mothers who had history of low birth weight should be more cautious during present pregnancy so that repetition of LBW can be avoided.

References
Histopathological Changes on 105 Serial Interval Renal Allograft Biopsies Done on 35 Renal Transplant Patients - A Single Center Study

KBM Hadiuzzaman, Syed Fazlul Islam, Munirunnessa, Rana Mokarrom Hossain, Omar Faruque, Fahmida Haque, AH Hamid Ahmed

Abstract
To detect histological changes in renal transplant patients, renal transplant biopsies were done and quantification of clinical and subclinical rejections were made. A total of 105 histological studies were performed among thirty five kidney transplant recipients over a period of two years. All received cyclosporine based immunosuppressive regime. Biopsy of every transplant patient was done on just after vascular anastomosis (per operative), further biopsied samples were taken at fourteenth postoperative day and at the end of three months. Per operative biopsies showed absolutely normal histology in 28(80%) cases, in 4 cases 10% glomeruli showed sclerosis and in 3 cases 16% glomeruli showed sclerosis.

At 14th post operative day, 60% patients showed absolutely normal histology, 28% had histological features of rejection among them half had clinical manifestations of rejections and half were subclinical. Cyclosporine toxicity were detected in 5.6% cases, acute tubular necrosis in 5.6%, and recurrent glomerulonephritis in 3% cases. Biopsies after 3 months showed normal histology in 54.28% cases, clinical rejection in 11.42% cases, sub clinical rejection in 5.7% cases, borderline changes in 5.7% cases, Cyclosporine toxicity in 5.7% cases and recurrent glomerulonephritis in 2.8% cases. Protocol biopsy was performed in all 35 patients after 3 months of transplantation and among them 54.28% showed normal histology, 11.42% had clinical rejection, 20% sub clinical rejection, 5-7% borderline changes, 5.7% cyclosporine toxicity and 2.8% suffered from recurrent glomerulonephritis. According to Banff numerical scoring of clinical rejection, Banff grade I and III were found in 25% cases and grade II was in 50%cases. In subclinical rejection, Banff grade I was found in 70% and grade II was found in 30% cases. Histopathology at 14th POD and day 90, among clinical rejection cases, majority were found to have Banff grade II and among subclinical rejection cases majority were of grade I.

Key words: Protocol Biopsy, Transplant rejection, Banff classification.

(Sir Salimullah Med Coll J 2018; 26: 12-15)

Introduction
in the setting of acute graft dysfunction renal allograft biopsies have traditionally been performed. However, several groups have performed graft biopsies at times of stable graft function, and more recently, after treatment of rejection episodes. For Banff 97, an “adequate” specimen is now defined as a biopsy with 10 or more glomeruli and at least two arteries. The threshold for a minimal sample is seven glomeruli and one artery. Rejection can be patchy. With one core of cortical tissue, the sensitivity is 90%, but increases to 99% with two cores. If only medulla is present, sensitivity is between 75 and 80%. In Banff classification Grade I is usually subclinical rejection. Subclinical rejection (SCR) in histologically defined acute rejection is characterized by tubulointerstitial mononuclear infiltration identified from biopsy specimen, but without concurrent functional deterioration variably defined as serum creatinine not exceeding 10%, 20% or 25% of baseline values. Banff Classification of renal transplant pathology,
diagnostic criteria-
1. Normal histology 2. Hyperacute vascular damage with rejection, polymorphs accumulation and thrombosis (within 72 hrs after Transplantation) 3. Borderline change No intimal arteritis, mild/moderate focal mononuclear infiltration, foci of mild tubulitis (<4 Mononuclear cells) 4. Acute rejection - Grade I- significant interstitial infiltration (> 25% of parenchyma) and foci of moderate tubulitis (> 4 cells).

Grade II- A) significant interstitial infiltration and foci of severe tubulitis (>10 cells) and/or
B) mild and moderate intimal arteritis.

Grade III- severe intimal arteritis and/or focal infarction or interstitial hemorrhage.

Materials and Methods
For this study, thirty five subjects were selected from the department of Nephrology, BSMMU, Dhaka. It is a prospective observational study. Per operative protocol biopsy was done just after completion of vascular anastomosis. Tissue was obtained from upper pole of transplanted kidney by a scalpel. Tissue was preserved in a test-tube with 10% formalin. Tissue was immediately sent for histopathological examination. For histopathology haemotoxylin and eosin (H&E) and periodic acid Schiff (PAS) stain were done. A protocol biopsy of transplanted kidney was also done at 14th POD and at the end of three months (day 90) by 7.6 cm, 18G, Tru-cut kidney biopsy needle. Upper pole of the transplanted kidney was selected for biopsy.

Histopathological slides were examined (light microscopy) by the same histopathologist. Then histopathological slides were categorized according to Banff 97 classification. Histological features of Cyclosporin toxicity, recurrence of primary glomerulonephritis and acute tubular necrosis were well clarified by histopathologist. The slides were reviewed to grade the acute rejections and to assign a numerical score for the different pathological components. Grade I (mild rejection) is a cellular rejection with interstitial infiltrate in more than 25% of the biopsy and with moderate tubulitis. Grade II (moderate rejection) has a significant interstitial inflammation, severe tubulitis, mild to moderate intimal arteritis. Grade III (severe rejection) includes severe intimal arteritis or evidence of focal infiltration or interstitial haemorrhage. Cyclosporin level in blood (C2) were done on 7th and 14th POD and then monthly for three consecutive months. Serum creatinine was done daily for first 14 days and then weekly for three months.

Results
Among 35 biopsies, per operative 23 showed normal histology (no sclerotic glomeruli), 6 showed 10% sclerotic glomeruli and 3 showed 16% sclerotic glomeruli.

Protocol biopsy at 14th post operative day showed 60% of patients were normal, 14.3% had clinical rejection (elevated serum creatinine along with histological features of rejections), 14.3% had sub clinical rejection (normal serum creatinine with

Figure. 1: Per Operative protocol biopsy: (n=35)

Figure-2: Photomicrograph showing two sclerosed glomeruli (H&E, x20)
histological features of rejections), 5.6% cyclosporine toxicity, 5.6%, acute tubular necrosis and 2.9% had recurrent glomerulonephritis. Banff numerical scoring for the biopsies according to the pathological grade of rejection showed, Banff grade I (20%), grade II (60%) and grade III (20%) in clinical rejection group and Banff grade I (80%) and grade II (20%) in subclinical rejection group.

Protocol biopsy performed in all 35 patients after 3 months of transplantation. It showed normal histology in 54.28% cases, 11.42% had clinical rejection, 20% had subclinical rejection, 5.7% had borderline changes, 5.7% revealed cyclosporine toxicity and 2.8% underwent recurrent glomerulonephritis. According to Banff, numerical scoring of clinical rejection revealed grade I in 25% cases, grade II in 50% cases, and grade III in 25% cases. In subclinical rejection, Banff grade I was found in 70% cases and grade II in 30% cases.
Discussion

The present study described the histological changes of renal allograft biopsies done at different intervals. Histological classification of clinical and subclinical rejection was made by Banff 97 criteria. Histological changes of acute tubular necrosis, cyclosporine toxicity and recurrence of primary glomerulonephritis were described adequately.

The presence of subclinical rejection by Banff criteria was approximately 30% in the first 3 months in renal transplant rejection. A center published data that seventy renal allograft biopsies were done in 31 patients, routinely at 1, 2, and 3 months post transplant, and as clinically indicated, using an automated biopsy “gun.” The histological diagnosis was made according to the Banff schema, which emphasizes tubulitis and vascular inflammation over mononuclear cell infiltration. Fifty-three biopsies satisfied histological inclusion criteria. Twenty-nine biopsies were obtained from stable patients, defined as those in whom serum creatinine had changed < 10% in 2 weeks, and in whom immunosuppression (cyclosporine, azathioprine, and prednisone) had not been increased in that interval. Of these biopsies, 30% (9/29) showed rejection. The presence of subclinical rejection by Banff criteria was approximately 30% in the first 3 months in renal transplant rejection. A center published data that seventy renal allograft biopsies were done in 31 patients, routinely at 1, 2, and 3 months post transplant, and as clinically indicated, using an automated biopsy “gun.” The histological diagnosis was made according to the Banff schema, which emphasizes tubulitis and vascular inflammation over mononuclear cell infiltration. Fifty-three biopsies satisfied histological inclusion criteria. Twenty-nine biopsies were obtained from stable patients, defined as those in whom serum creatinine had changed < 10% in 2 weeks, and in whom immunosuppression (cyclosporine, azathioprine, and prednisone) had not been increased in that interval. Of these biopsies, 30% (9/29) showed rejection.

To determine the significance of early subclinical rejection, protocol biopsies performed on days 7 and 28 during a 4-year period. Among 115 patients with stable graft function at the time of biopsy; 76 adequate biopsies at day 7 and 79 at day 28 were performed. At day 7, 10 biopsy specimens (13%) showed acute rejection (AR) and 9 (12%) showed borderline changes. At day 28, six biopsy specimens (8%) showed AR and 13 (16%) showed borderline changes.

In this present study protocol biopsy at 14th POD showed normal histology in 60% patients. 14.3% had clinical rejection and 14.3% had subclinical rejection. Among clinical rejection cases majority are of Banff grade II (50%), and among subclinical rejection cases, majority are of Banff grade I (80%).

When Protocol biopsy were done at the end of 3 month, 54.28% showed normal histology and 11.42% had clinical rejection. Among clinical rejection cases, Banff grade I were 25%, Grade II were 50% and grade III were 25% cases. Among patients having subclinical rejection, Banff grade I were 70% and grade II were 30%. Sub clinical rejection detected in a different study was 30% In this present study sub clinical rejection was 14.3% at 14th P.O.D and 20% at the end of 3 months. In one report recurrent glomerulonephritis was present in 36%-42%. Higher rates of recurrence have been reported in pediatric transplant recipients, in whom recurrent glomerulonephritis has been the cause of 6% of first allograft losses and 12% of subsequent graft losses. Patients who experience first allograft loss form recurrent glomerulonephritis are also suffer from higher risk of recurrence in subsequent graft loss, documented up to 48%.

In this present study, recurrence of glomerulonephritis was detected in 2.9% case at 14th P.O.D biopsy and 2.85% cases at the end of 3 months biopsy. Glomerulosclerosis greater than 20% has been correlated with poor graft outcome. Data in different study suggests that donor glomerulo-sclerosis greater than 20% increases the risk of delayed graft function and poor outcome. In the present study per operative protocol biopsy 3 kidney showed 15%-20% sclerotic glomeruli which is more common in dysfunction group.

Conclusion

Histopathological evaluation of routine allograft biopsy in different transplant center of Bangladesh can detect clinical and subclinical rejection earlier.

References


Frequency of Hepatitis C Virus Infection Among Multi-Transfused Patients- A prospective study

Munshi Mohd. Habibullah¹, Ayesha Khatun², Daanish Arefin Biswas³, Farah Anjum Sonia⁴, Md. Wasim⁵, Bepasha Naznin⁶

Abstract

Background: Hepatitis C virus (HCV) is a major concern in multi-transfused patients (MTPs) all over the world. In Bangladesh, concern over Hepatitis C is increasing with time. Huge treatment cost along with morbidity of Hepatitis C linked chronic liver disease is also important in these patients. Facts of transfusion transmitted HCV is inadequate in Bangladesh.

Objectives: Primary objective of this study is to explore frequency of HCV infection in MTP patients in a private blood bank & transfusion center with high turnover of such patients.

Methodology: A prospective study was conducted between January 2012 to December 2016 among the MTPs attending Quantum Blood Bank at Dhaka. A total of 972 multi-transfused patients with unknown Hepatitis C status were included in this study. Those patients who previously received transfusions of two or more units of blood or blood components per month for at least 6 months were included.

Results: The study group comprised 972 MTPs, of them 563(57.92%) were male and 409(42.07%) were female. Anti-HCV test was reactive in 37 cases (3.80%) and rests are found to be negative. Maximum 534 (54.93%) MTPs were within the 10-25 years’ age group followed by 167 (17.18%) were eldest (>40 years). Maximum 560 (57.61%) patients were suffering from thalassemia with hemophilicacs next with 181 (18.62%). 865 MTPs (89%) regularly received blood from voluntary donors and the rest 107 (11%) had received blood from non-voluntary donors. Those had blood from non-voluntary donors were exposed to HCV infection more (72.9%) than those transfused with voluntary donors. Majority of HCV reactive MTPs were bearing Rhesus negative blood group 21(56.75%).

Conclusion: The present study was conducted in only one private transfusion center of Bangladesh. The result does not denote the real condition of MTPs of Bangladesh. Measures like donor education programs, more comprehensive donor selection criteria and improved serological protocols are needed. Voluntary blood donation should be encouraged. Longitudinal study with large sample size involving countrywide multiple centers are recommended.

Key words: Hepatitis C virus (HCV), Multitransfused patients(MTPs), Transfusion Transmitted Infection (TTI).

(Introduction)

Hepatitis C virus infection is now a days recognized as a disease of global importance. It is of concern both to industrialized and to developing countries.¹ Overall, the available data suggest that the prevalence of HCV infection is approximately 2.2–3.0% worldwide (130–170 million people).²³ HCV is the most likely hepatitis virus to cause chronic liver infection. HCV is a significant cause of cirrhosis, hepatic failure, and hepatocellular carcinoma.⁴⁵

In developed countries, voluntary blood donation, blood donor education, history-based donor selection and universal blood donor laboratory screening have

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resulted in improved blood safety and reduced residual risk for transfusion-transmissible infections (TTI), including HCV. Prevalence of HCV in blood donors in different countries of the developed world has been reported to be between 0.3 and 1.5%.

In contrast, HCV is higher among developing countries, because there are problems such as low quality in blood screening tests, unsafe medical practices, and intravenous drug abuse with shared needle. For example, higher HCV prevalence have been reported in Southeast Asian countries, including India (1.5%), Malaysia (2.3%), Philippines (2.3%), Pakistan (8.1%), and in equatorial Africa (6.5%), as high as 20% in Egypt.

The transmission of HCV is primarily through exposure to infected blood and it is the most common mode of transmission of HCV infection as it allows a large quantum of infective virions into the susceptible patient. The countries with a higher HCV prevalence in general population had a higher prevalence rate among MTPs patients, too. Transfusion-transmitted infections (TTI) are therefore continue to be a serious problem in underdeveloped areas and less serious in developing areas of the world. Multitransfused patients (MTPs) are at a particularly increased risk. Knowledge of the prevalence of TTI among MTPs in developing countries is an appropriate indicator of the risk of TTI. Furthermore, a thorough understanding of the epidemiological characteristics of TTI in heavily transfused patients may be of major assistance in elucidation of important aspects of the transmission chain of these infections and so further improvement in the safety of the blood supply and estimates of the residual risk of transmission in countries where complete donor screening is being carried out.

Previous Bangladeshi studies among smaller scale multitransfused patients showed extensive variations from 0.024% to 31%. Bangladesh was listed among countries with average national prevalence rate of 3.4 in one study.

This study would provide support for further research aimed at improving blood safety in Bangladesh. Although the incidence of transfusion-transmitted hepatitis has been dramatically reduced after introduction of mandatory and reliable screening of blood donors, MTPs patients may still develop liver dysfunction due to infection with blood born agents like HBV & HCV.

The aims of this study are:
1) To estimate the frequency of Hepatitis C virus infection amongst multiple blood transfused patients of different aetiology.
2) To evaluate information regarding multitransfused patients in relation to age, sex, blood group and total number of transfusion.
3) To determine association of HCV infection in relation to number transfusions received.

Materials and Methods
It was a prospective cross-sectional study. The study was conducted at a private blood transfusion center named QUANTUM Blood Bank at Dhaka Metropolitan City. This transfusion center along with blood bank had day care facilities for on need basis transfusion with high patient turnover rate. The study was conducted during January 2012 to December 2016.

Inclusion criteria:
(1) The patients who were suffering from different diseases who were receiving regular transfusions of two or more units of blood or blood components per month for at least last 6 months or more.
(2) The patients who did not know their Hepatitis C status were included.

Exclusion criteria:
(1) Patients who were previously known to be HCV Positive.
(2) Repetition of same multitransfused patients during this time period.

A total of 972 patients were selected. Complete history and physical examination was carried out in all these patients and blood sample was collected for screening HCV. Laboratory study was carried out in the Laboratory Division of Quantum Foundation, Dhaka. Anti-HCV test done by standard serological screening test of ELISA procedure using kits from ACON Anti-HCV-PLUS version 2 as per guideline laid down by manufacturer kits. Cut off index of the ELISA HCV test kit was 1.000. Reactive sera were re-tested using the same method.
structured interview schedule was developed for collection of data. Data management and screening was done by master tabulation. Simple descriptive analysis were done by Libre Office Xcel. Data analysis was performed on SPSS for Windows Version 18. (IBM Corp., New York, USA).

**Results**

The study group comprised 972 MTPs, of them 563 (57.92%) were male and 409 (42.07%) were female. (Table I). Nearly half 534 (54.93%) are within the 10-25 years’ age group, followed by 167 (17.18%) who are eldest (above 40 years), 139 (14.30%) were of youngest group (<10 years) and rest 132 (13.58%) from 26-40 years age group. (Table II) Mean SD age was 17.9±6.0. Maximum 560 (57.61%) patients were suffering from thalassemia with hemophiliacs in second place 181 (18.62%). (Table III) Most of the patients were of blood group O 482 (49%), followed by B 20.88 (203), A 188 (19.34%) and AB 99 (10.18%) (Table III). Among the patients 865 (89%) regularly received blood from voluntary or relative blood donors in past years and the rest 107 (11%) have history of receiving blood from non-voluntary blood donors. (Figure 1) Maximum 623 (64.09%) patients had received between 11-30 units of blood or components. (Figure 2) Anti-HCV test were reactive in 37 cases (3.80%) and rests were found to be negative. (Figure 3) Majority of HCV reactive MTPs were male 23 (62.16%), suffering from thalassemia 22 (59.45%) and was of Rhesus negative blood group 21 (56.75%). Highest percentage (21.62% each) of HCV reactive individuals had received between 101-150 and 201-250 units of blood products with 18.91% received 151-200 units and 8.10% was among highest blood product recipient. (Table IV). Majority of HCV reactive MTPs are male 23 (62.16%) and of Rhesus negative blood group 21 (56.75%).

Most percentage (10.29%) of HCV positive patients were suffering from chronic kidney disease with history of hemodialysis procedures. (Table V). In addition, patients who received blood from nonvoluntary donors (11%) were exposed to HCV infection more (72.9%) than those transfused with voluntary donors. (Table VI).
Table IV
Distribution of ABO and Rhesus Blood Groups of study subjects (n=972)

<table>
<thead>
<tr>
<th>Blood Group</th>
<th>Number of subjects</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>O</td>
<td>482</td>
<td>49.59</td>
</tr>
<tr>
<td>A</td>
<td>188</td>
<td>19.34</td>
</tr>
<tr>
<td>B</td>
<td>203</td>
<td>20.88</td>
</tr>
<tr>
<td>AB</td>
<td>99</td>
<td>10.18</td>
</tr>
<tr>
<td>Rhesus Positive</td>
<td>845</td>
<td>86.90</td>
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<tr>
<td>Rhesus Negative</td>
<td>127</td>
<td>13.06</td>
</tr>
</tbody>
</table>

Table V
Approximate number of transfusions (in unit) of whole blood or blood component in lifetime of patients and number reactive HCV antibody (n = 37)

<table>
<thead>
<tr>
<th>No. of units</th>
<th>Total No. of blood/component of HCV transfused in patients (Approximate)</th>
<th>Number reactive HCV cases (a) (Approximate)</th>
<th>Percentage of patients reactive HCV [(a/37)*100]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-50</td>
<td>115</td>
<td>01</td>
<td>2.70</td>
</tr>
<tr>
<td>51-100</td>
<td>135</td>
<td>05</td>
<td>13.51</td>
</tr>
<tr>
<td>101-150</td>
<td>256</td>
<td>08</td>
<td>21.62</td>
</tr>
<tr>
<td>151-200</td>
<td>185</td>
<td>07</td>
<td>18.91</td>
</tr>
<tr>
<td>201-250</td>
<td>115</td>
<td>08</td>
<td>21.62</td>
</tr>
<tr>
<td>251-300</td>
<td>101</td>
<td>05</td>
<td>13.51</td>
</tr>
<tr>
<td>&gt;300</td>
<td>65</td>
<td>03</td>
<td>8.10</td>
</tr>
</tbody>
</table>

Table VI
Distribution of HCV infected patients according to disease (n = 37)

<table>
<thead>
<tr>
<th>Diseases</th>
<th>MTPs (a)</th>
<th>HCV reactive (b)</th>
<th>Percentage of patients reactive HCV [(a/b)*100%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thalassemia</td>
<td>560</td>
<td>21</td>
<td>3.75%</td>
</tr>
<tr>
<td>Hemophilia A/B</td>
<td>181</td>
<td>6</td>
<td>3.31%</td>
</tr>
<tr>
<td>Chronic Kidney Disease especially Hemodialysis patient</td>
<td>68</td>
<td>7</td>
<td>10.29%</td>
</tr>
<tr>
<td>Leukemias</td>
<td>56</td>
<td>2</td>
<td>3.57%</td>
</tr>
<tr>
<td>Aplastic anemia</td>
<td>42</td>
<td>1</td>
<td>2.38%</td>
</tr>
<tr>
<td>Malignant (Post Chemo/Radiotherapy)</td>
<td>31</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sickle cell anemia</td>
<td>17</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Iron deficiency anemia</td>
<td>09</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Thrombocytopenia</td>
<td>08</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Fig-2: Distribution of patients according to number of units transfused (n=972)

Fig-3: Distribution of MTPs on results of Anti HCV test (n=972)
### Table VII

**Comparison of HCV Positive patients according to type of donor**

<table>
<thead>
<tr>
<th>Type of donor from whom blood was received</th>
<th>Percentage</th>
<th>Number of HCV Reactive patient (n = 37)</th>
<th>Percentage among HCV Reactive cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voluntary</td>
<td>89%</td>
<td>10</td>
<td>27.1%</td>
</tr>
<tr>
<td>Non-voluntary</td>
<td>11%</td>
<td>27</td>
<td>72.9%</td>
</tr>
</tbody>
</table>

### Table VIII

**Comparison between findings reported by various authors from different parts of the world with present study**

<table>
<thead>
<tr>
<th>No.</th>
<th>Author(S)</th>
<th>Country</th>
<th>Year</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Williams et al. 15</td>
<td>India</td>
<td>1992</td>
<td>2.2</td>
</tr>
<tr>
<td>02</td>
<td>Amarapurkar et al.16</td>
<td>India</td>
<td>1992</td>
<td>17.5</td>
</tr>
<tr>
<td>03</td>
<td>Cacoparado et al.17</td>
<td>Italy</td>
<td>1992</td>
<td>47.0</td>
</tr>
<tr>
<td>04</td>
<td>Choudhury N et al.18</td>
<td>India</td>
<td>1993-95(93)</td>
<td>23.0</td>
</tr>
<tr>
<td>05</td>
<td>Covas et al.19</td>
<td>Brazil</td>
<td>1993</td>
<td>46.8</td>
</tr>
<tr>
<td>06</td>
<td>Agarwal et al.20</td>
<td>India</td>
<td>1993</td>
<td>45.0</td>
</tr>
<tr>
<td>07</td>
<td>Choudhury N et al.18</td>
<td>India</td>
<td>1993-95(94)</td>
<td>30.7</td>
</tr>
<tr>
<td>08</td>
<td>Alegria et al.21</td>
<td>Chili</td>
<td>1994</td>
<td>52.0</td>
</tr>
<tr>
<td>09</td>
<td>Choudhury N et al.18</td>
<td>India</td>
<td>1993-95(95)</td>
<td>35.9</td>
</tr>
<tr>
<td>10</td>
<td>Bhatti et al.22</td>
<td>Pakistan</td>
<td>1995</td>
<td>63.8</td>
</tr>
<tr>
<td>11</td>
<td>Henschel et al.23</td>
<td>Germany</td>
<td>1996</td>
<td>43.0</td>
</tr>
<tr>
<td>12</td>
<td>Laosombat et al.24</td>
<td>Thailand</td>
<td>1997</td>
<td>23.8</td>
</tr>
<tr>
<td>13</td>
<td>Jamal et al.15</td>
<td>Malaysia</td>
<td>1998</td>
<td>22.4</td>
</tr>
<tr>
<td>14</td>
<td>Poovorawan et al.25</td>
<td>Thailand</td>
<td>1998</td>
<td>32.6</td>
</tr>
<tr>
<td>15</td>
<td>Juneja et al.26</td>
<td>India</td>
<td>1998</td>
<td>15</td>
</tr>
<tr>
<td>16</td>
<td>Mollah A et al.27</td>
<td>Bangladesh</td>
<td>2001</td>
<td>12.5</td>
</tr>
<tr>
<td>17</td>
<td>Akhtar et al.28</td>
<td>Pakistan</td>
<td>2002</td>
<td>20.5</td>
</tr>
<tr>
<td>18</td>
<td>Singh H et al.29</td>
<td>Lucknow, India</td>
<td>2003</td>
<td>20</td>
</tr>
<tr>
<td>19</td>
<td>Ikram et al.30</td>
<td>Rawalpindi, Pakistan</td>
<td>2003</td>
<td>42</td>
</tr>
<tr>
<td>21</td>
<td>Erich V et al.31</td>
<td>Brazil</td>
<td>2005</td>
<td>16.7</td>
</tr>
<tr>
<td>22</td>
<td>Lopez L et al.32</td>
<td>Uruguay</td>
<td>2005</td>
<td>12.7</td>
</tr>
<tr>
<td>23</td>
<td>Kapoor C et al.33</td>
<td>Ouetta, India</td>
<td>2006</td>
<td>30</td>
</tr>
<tr>
<td>24</td>
<td>Ocak S et al.34</td>
<td>Turkey</td>
<td>2006</td>
<td>4.5</td>
</tr>
<tr>
<td>25</td>
<td>Sheyyab M et al.35</td>
<td>Amman, Jordan</td>
<td>2000-2001</td>
<td>40.5</td>
</tr>
<tr>
<td>26</td>
<td>Hussain H et al.13</td>
<td>Pakistan</td>
<td>2002–2003</td>
<td>41.7</td>
</tr>
<tr>
<td>28</td>
<td>Present study</td>
<td>Bangladesh</td>
<td>2012-2016</td>
<td>3.8</td>
</tr>
</tbody>
</table>
Discussion

HCV infection was the most prevalent TTI among MTPs, and remains a major health problem for these patients. The implementation of measures such as donor education programs, standards for donor selection criteria, and of improved serological screening protocols, paralleled the decline in the prevalence of TTI, especially of HCV, observed in MTPs, underscoring the importance of such measures for the reduction of the residual risk of TTI.\textsuperscript{14}

Out of 972 patients more than half were (55.0%) within the 10-25 years age group followed by 17.14%, 14.29% and 14.29% were above 40 years, 26-40 and less than 10 years respectively.

Anti-HCV test was positive in 3.80% (n=37) and rests were found negative. Different studies around the world found high prevalence of HCV infection among the multitransfused patients with thalassemia and hemophilia. (Table VII) Disparity among the prevalence of HCV infection of MTPs in different countries reflects multiple factors associated with the fact of implementation of Anti HCV screening program as integral part of screening of blood products in different years in different regions of world.

The prevalence of HCV infection among MTPs patients in our study (3.80%) was less than most of other studies ranging from 4.5 to 63.8.\textsuperscript{5-10} Williams et al have lower rate of prevalence of 2.2 than our one .The HCV prevalence among studies from Bangladesh noted at 12.5% & 16.7%. Among Indian studies minimum was 2.2%\textsuperscript{27} and maximum 35.9%.\textsuperscript{36} Another country of this sub-continent, Pakistan, has much higher values of ranging 20.5 to 63.8 %. Countries from South America like Brazil, Chili and Uruguay recorded massive variations in prevalence, i.e. from 12.75 up to 52%. In a systemic review from Egypt showed that multi-transfused patients are affected with HCV ranges from 10-55% according to multiple studies.\textsuperscript{37}

These variations in results with other studies suggest that other factors are contributing to the relatively low rates of HCV infection among MTPs in our study. One possible factor could be, different authors using different laboratory tests with variable validity for detecting antibody to HC. Many reports were based on only ICT tests without complementary and confirmation tests as they were not available in all countries few years before. However, some of those have used ELISA and very few use used PCR as a confirmation test.

The second reason is that the prevalence of HCV infection found in general population in Bangladesh is very low 0.82% and 0.88 (<1%).\textsuperscript{38,39} As a result, rate of transfusion transmitted HCV in MTPs are also less than others.

The third factor is the policies that implemented by Government related agencies and blood transfusion organization, about screening of blood to provide safe blood to all. In Bangladesh, routine screening for blood borne diseases has been mainly conducted among blood and tissue donors since the 1997, and it seems that this policy reduced infection rate since that time.\textsuperscript{40} This shows the importance of the blood donors screening program. But still, considering the vast population of the country, even low prevalence amounts to large number of infected people.\textsuperscript{41}

Laosombat et al in a study showed that the number of blood transfusions received by anti-HCV positive multitransfused thalassemic patients were significantly higher than that by anti-HCV negative thalassemic patients. Our results showed no linear correlation between number of bags with increased HCV positivity.

Nearly 11% of HCV positive patients were suffering from chronic kidney disease with history of hemodialysis procedures. This finding is consistent with studies showing that HCV related liver disease is a significant cause of morbidity and mortality in patients with renal disease who is treated with dialysis.\textsuperscript{42} Thalassemia patients formed the main bulk (57.61%) of our study population. But still their HCV infectivity is significant (3.75% of the patients. (Table III & Table VI). After dramatically improving the blood safety with new diagnostic tools, alternative routes of transmission, such as direct inoculation, may explain that in spite of blood donor screening why HCV has been found in blood recipients. It may be via contaminated needles, scalpels, or other pointed or sharp objects. Some of the thalassemic patients shared subcutaneous infusion pump for iron chelation which might be the source of nosocomial infection.\textsuperscript{43} Infected medical personals can also transmit HCV.

We think that previously reported high prevalence of HCV infection among high-risk patients has some
bias including inappropriate sample size and unreliable laboratory tests.

**Conclusion**

As vaccine is available in case of hepatitis B, immunization against this virus would effectively protect against transfusion transmitted hepatitis B. However, since no such vaccine is so far available against hepatitis C, the only effective protective measure against this virus is provision of HCV negative blood for transfusion. HCV infection is a preventable disease. Therefore, screening of transfused blood for HCV in not only mandatory, but also it is essential to use the most sensitive screening methods with least possible false negative results. Serological screening of every multitransfused patient can be carried out at 3 months’ interval. Moreover, by detecting HCV infection early, antiviral treatment can be offered earlier in the course of the disease which is more effective than starting at a later stage. Stringent measures in donor screening including donor education, better donor recruitment, promoting and encouraging 100% voluntary blood donation, screening of blood and blood products using dual testing strategy with high sensitivity serological assays and NAT for HCV would considerably improve the current and enhance the safety of the blood intended for transfusion. Longitudinal study with larger sample size is recommended to reflect the real situation and for health policy making. Provision of safe and adequate blood supply to these MTPs is a key to improve their quality of life and longevity.

**Study limitations**

The present study was conducted in a selected transfusion center of Bangladesh. Generalization from this study, therefore, cannot be made for the whole country. Duration of this study was only 5 (five) years with relatively small sample size. Only ELISA method was used for the identification of seropositivity of the HCV. Many of the respondents replied to questions from their memories that could have led to recall bias. There are missing data in records of patients about exact number of units they have transfused, risk factors such as drug abuse, sexual and addiction history of adults, tattooing, and high-risk behaviors. These were not assessed in this study.

**References:**

14. Parti D., Zanella A., Farma E., Bosoni P., Mattei CD. A multicentre prospective study on the risk of acquiring liver disease in anti-hepatitis C virus negative patients...


Gestational Diabetes Mellitus (GDM): Patient Profile and Management in a Tertiary Level Hospital

Florida Rahman¹, Banani Bhoumik², Ratu Rumana Binte Rahman³ Sarwar Ibne Salam⁴

Abstract:
The prevalence of Gestational Diabetes Mellitus is rapidly rising all over the globe at an alarming rate. GDM is defined as any degree of glucose intolerance with onset or first recognition during pregnancy.

Methods: All the admitted cases of GDM in Sir Salimullah Medical College & Mitford Hospital from April 2013 to September 2013 were enrolled for the study. Informed consent was taken from each patient. Data was collected by using a standard set of questionnaire to analyze the patient profile and management pattern of patients with GDM.

Results: GDM was more common in the age group of 26 to 35 years and was more prevalent in urban population (88.4%). Majority of the cases were multigravida (69.2%). More than two third (71.2%) of the study patients were of average income group. Most of them (80.8%) were housewives. Nearly one fourth (23.1%) of the study patients had GDM in their previous pregnancy and more than a half (57.7%) of the cases had family history of DM. Only 11.6% of cases were having polyhydramnios and 15.4% of cases were having UTI. Majority of study subjects (76.9%) required caesarian section. Most of the patients (69.2%) needed insulin. Significant fetal/neonatal complications were not observed in this study.

Conclusions: GDM is one of the most common medical problems in our country. It adversely affects both the maternal and the perinatal outcome. All GDM patients who were diagnosed early had less complications related to mother and child. So in developing country like Bangladesh, it is an utmost necessity to analyze the patient profile, to identify the risk factors, to diagnose and to adopt a management protocol. Thus it will help to reduce the maternal and the perinatal morbidity and mortality.

Key words: GDM, polyhydromnios, Macrosomia, Insulin.

(Sir Salimullah Med Coll J 2018; 26: 25-30)

Introduction:
Gestational diabetes mellitus is defined as any degree of glucose intolerance with onset or first recognition during pregnancy¹. This definition acknowledges the possibility that patient may have previously undiagnosed Diabetes or may have developed diabetes coincidentally with pregnancy. This entity usually presents late in second trimester or in third trimester.²

Diabetes during pregnancy possesses significant risk to the mother and fetus. The most common problem of mother is an increased incidence of preeclampsia and operative interference.³Infants born to mothers with GDM are at risk of being both large for gestational age (macrosomia),⁴ and small for gestational age and intrauterine growth retardation.⁵ Macrosomia in turn increases the risk of instrumental deliveries (e.g. forceps, ventouse) and caesarean section or problems during vaginal delivery (such as shoulder dystocia). Macrosomia may affect 12% of normal women compared to 20% of patients with GDM.⁶ Children of women with GDM have an increased risk for childhood and adult obesity, glucose intolerance and type 2 diabetes later in life.⁷ This risk relates to increased maternal glucose values⁸. Due to increased level of human placental lactogen, steroid hormones there is marked insulin resistance during pregnancy. Glucose tolerance deteriorates in pregnancy but...

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4. Assistant professor, dept of Orthopaedics DMCH.
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about 97% to 98% of all pregnant women retain a normal tolerance and only 2 to 3% develop GDM.⁹

Neonates born from women with consistently high blood sugar levels are at risk of hypoglycemia, polycythemia, hypocalcaemia and hypomagnesaemia.¹⁰ Untreated GDM also interferes lung maturation causing Respiratory Distress syndrome (RDS) due to impaired surfactant synthesis. Studies have shown that the offspring of women with GDM are at a higher risk for congenital malformations.¹¹ Therefore the diagnosis of GDM is very important. Once it is diagnosed, multi-disciplinary management is important for good pregnancy outcomes.¹²

**The White classification**, named after Priscilla White, who pioneered in research on the effect of diabetes types on perinatal outcome, is widely used to assess maternal and fetal risk. It distinguishes between gestational diabetes (type A) and diabetes that existed prior to pregnancy (pre-gestational diabetes). These two groups are further subdivided according to their associated risks and management.

The two subtypes of gestational diabetes (diabetes which began during pregnancy) are:

**Type A1**: abnormal oral glucose tolerance test (OGTT), but normal blood glucose levels during fasting and two hours after meals; Diet modification is sufficient to control glucose levels

**Type A2**: abnormal OGTT compounded by abnormal glucose levels during fasting and/or after meals; additional therapy with insulin or other medications is required. It may be complicated with pelvic vessel atherosclerosis, nephropathy, hypertension, retinopathy, IHD, etc.

**Effect of Diabetes on Pregnancy:**
Carbohydrate intolerance during pregnancy causes significant increase in fetal and maternal mortality and morbidity. These women have a greater risk of abortion, pre-eclampsia, infection, postpartum hemorrhage and caesarean deliveries.

**Effect of Diabetes on Fetus:**

**Fetal Macrosomia:**
Birth weight above the 90th percentile for gestational age or greater than 4000 gm occurring in 15-45% of infants exposed to hyperglycemia.

### Congenital Malformation or Birth Defect
It affects about 6-10% of infants of diabetic mother.² Congenital malformation is related to severity of diabetes affecting organogenesis; in the first trimester. Initial maternal HbA1c level >7 is associated with this risk. Levels of >10 are associated with 23.5% of congenital anomalies, e.g. cardiac (ASD, VSD, transposition of great vessels), neural tube defect, renal agenesis, gastrointestinal and spinal anomaly.¹⁴

**Birth Injuries**
Shoulder dystocia, brachial plexus injury, facial nerve injury, and cephalhematoma are common.

**Growth Restriction**
Although most fetuses of diabetic mothers exhibit growth acceleration, growth restriction occurs with significant frequency in prepregnancy atherosclerotic mother.

Perinatal mortality and morbidity: Congenital malformations, respiratory distress syndrome (RDS), extreme prematurity, hyperbilirubinemia, hypocalcaemia, polycythemia and cardiomyopathy are main causes.

**Metabolic syndrome** The childhood metabolic syndrome includes childhood obesity, hypertension, dyslipidemia, and glucose intolerance

### Screening of Diabetes in Pregnancy
Diagnostic criteria in USA is usually accomplished by administration of 3 hour 100 gm OGTT after an overnight fast. Diagnosis of GDM is made when 2 or more thresholds are met or exceeded. Outside of the US a one-step approach to testing using a 2 hour 75 gm oral glucose load is widely used. According to IADPSG (International Association of Diabetes and Pregnancy Study Group) 2010, diagnosis of GDM can be made if there is one or more abnormal value on the 75 gm OGTT, Fasting > 92 mg/dl, 1 hr after glucose 180 mg/dl, 2 hr after glucose 153 mg/dl.

The obstetrician should manage the patient in collaboration with endocrinologist, nutritionist and neonatologist. The goal should be to achieve an optimum glycemic control as early as possible to prevent complications.

The study was done to analyze the characteristics of the patients, diagnosis, investigations &
treatment of these cases. Thus maternal and fetal outcome of these cases was evaluated.

Materials and Methods
It is a Cross Sectional study. The study was carried out in the Department of Obstetrics & Gynecology, Sir Salimullah Medical College & Mitford Hospital, Dhaka from April 2013 to September 2013. All the GDM patients who were admitted during this period in the Obstetrics & Gynaecology department of SSMC & MH were included.

A total of 52 cases GDM were enrolled in this study. GDM was diagnosed according to IADPSG 2010 criteria. A purposive sampling method was used. A questionnaire was prepared for data collection. Known cases of pregestational diabetes and Patients having GDM with any other co-morbidity (e.g. - Hypertension, Chronic Nephritis) were excluded. Patient profile, clinical presentation and maternal & fetal outcomes were main variables.

Data Processing and Analysis: Data analysis was systematically done by SPSS/PC, and MS Excel was used for the graphs.

Observation and Results

Table-I
Frequency table showing distribution of GDM as per age group (n=52)

<table>
<thead>
<tr>
<th>Age in years</th>
<th>Frequency (n=52)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-25</td>
<td>8</td>
<td>15.4</td>
</tr>
<tr>
<td>26-30</td>
<td>21</td>
<td>40.4</td>
</tr>
<tr>
<td>31-35</td>
<td>15</td>
<td>28.8</td>
</tr>
<tr>
<td>36-40</td>
<td>8</td>
<td>15.4</td>
</tr>
</tbody>
</table>

GDM is more common in the age group of 26 – 35 years.

Table-II
Frequency table showing distribution of GDM as per gravida (n=52)

<table>
<thead>
<tr>
<th>Gravida</th>
<th>Frequency (n=52)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primigravida</td>
<td>11</td>
<td>21.1</td>
</tr>
<tr>
<td>Multigravida</td>
<td>37</td>
<td>71.2</td>
</tr>
<tr>
<td>Grand multigravida</td>
<td>4</td>
<td>7.7</td>
</tr>
</tbody>
</table>

GDM is more common in multi gravid women (71.2%).
Table-VII  
Frequency table showing distribution of the study subject as per history of GDM in previous pregnancy (n=52)

<table>
<thead>
<tr>
<th>History of GDM</th>
<th>Frequency (n=52)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>12</td>
<td>23.1</td>
</tr>
<tr>
<td>Absent</td>
<td>40</td>
<td>76.9</td>
</tr>
</tbody>
</table>

23.1% patients had history of GDM in their previous pregnancy.

Table-VIII  
Frequency table showing distribution of GDM as per family history of DM (n=52)

<table>
<thead>
<tr>
<th>Family history of DM</th>
<th>Frequency (n=52)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>30</td>
<td>57.7</td>
</tr>
<tr>
<td>Absent</td>
<td>22</td>
<td>42.3</td>
</tr>
</tbody>
</table>

57.7% had positive family history.

Table-IX  
Frequency table showing maternal complications of study subjects (n=52)

<table>
<thead>
<tr>
<th>Complications</th>
<th>Frequency (n=52)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyhydramnios</td>
<td>06</td>
<td>11.6</td>
</tr>
<tr>
<td>Pre-eclampsia</td>
<td>02</td>
<td>3.8</td>
</tr>
<tr>
<td>Vulvovaginitis</td>
<td>04</td>
<td>7.7</td>
</tr>
<tr>
<td>UTI</td>
<td>08</td>
<td>15.4</td>
</tr>
<tr>
<td>Nil</td>
<td>32</td>
<td>61.5</td>
</tr>
</tbody>
</table>

15.4% had UTI, 11.6% had polyhydramnios, 7.7% had vulvovaginitis and 3.8% had pre-eclampsia.

Table-X  
Frequency table showing distribution of GDM as per mode of delivery (n=52)

<table>
<thead>
<tr>
<th>Mode of delivery</th>
<th>Frequency (n=52)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaginal delivery</td>
<td>12</td>
<td>23.1</td>
</tr>
<tr>
<td>Caesarean section</td>
<td>40</td>
<td>76.9</td>
</tr>
</tbody>
</table>

It was observed that majority (76.9%) underwent caesarean section.

Table-XI  
Frequency table showing management of GDM (n=52)

<table>
<thead>
<tr>
<th>Management</th>
<th>Frequency (n=52)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diet + Prescribed exercise</td>
<td>14</td>
<td>27</td>
</tr>
<tr>
<td>Diet + Insulin</td>
<td>36</td>
<td>69.2</td>
</tr>
<tr>
<td>Oral Hypoglycemic Agents</td>
<td>02</td>
<td>3.8</td>
</tr>
</tbody>
</table>

69.2% was managed by diet plus insulin.

Table-XII  
Frequency table showing the birth weight of baby of study subject (n=52).

<table>
<thead>
<tr>
<th>Birth weight</th>
<th>Frequency (n=52)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low birth weight (&lt;2.5kg)</td>
<td>01</td>
<td>1.9</td>
</tr>
<tr>
<td>Normal birth weight(2.5-4kg)</td>
<td>42</td>
<td>80.8</td>
</tr>
<tr>
<td>Macrocosmic baby (&gt;4kg)</td>
<td>09</td>
<td>17.3</td>
</tr>
</tbody>
</table>

Majority (80.8%) of babies had normal birth weight.

Table-XIII  
Frequency table showing neonatal complications of study subject (n=52).

<table>
<thead>
<tr>
<th>Complications</th>
<th>Frequency (n=52)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypoglycemia</td>
<td>04</td>
<td>7.7</td>
</tr>
<tr>
<td>Hyperbilirubinemia</td>
<td>08</td>
<td>15.4</td>
</tr>
<tr>
<td>IUGR</td>
<td>01</td>
<td>1.9</td>
</tr>
<tr>
<td>RDS</td>
<td>01</td>
<td>1.9</td>
</tr>
<tr>
<td>Nil</td>
<td>38</td>
<td>73.1</td>
</tr>
</tbody>
</table>

73.1% neo-nate had no significant complications. Other results are depicted in the above table.

Discussion  
GDM is one of the most important medical and endocrine disorders encountered in obstetrical practice. Diabetes and pregnancy may mutually affect each other over a range of interaction from conception to delivery and possibly even later. Proper screening, diagnosis and management can reduce both maternal and perinatal mortality and morbidity.

The aim of this study was to analyze the patient profile and management of gestational diabetes...
mellitus. It would help in identifying patients at risk and of taking appropriate measures about the management of GDM patients.

52 cases of women with gestational diabetes mellitus were included in this study. Their antenatal, intranatal and postnatal periods were thoroughly observed. Maternal and perinatal events of these patients were recorded and analyzed systematically. The present study findings were discussed and compared with previously published relevant studies.

In this current study it was observed that most of GDM cases were detected in the age group of 26-35 years which accounted more than 50% of total GDM cases detected. It is consistent with the age group described in the literature. It was observed in this study that the majority of cases were multigravida (71.2%). Similar observation was made by V.Seshiah, in Chennai, (2001) where he revealed that the prevalence of GDM was increased with the number gravida.

In this study more than two third (69.2%) of the study subjects were from average income group (69.2%), 19.3% were from above average income group and 11.5% were from below average income group. Majority of the patients (80.8%) were housewives.

In this current study most of the GDM patients (57.7%) were in regular antenatal check up. There was relationship between ANC and outcome of GDM as it helps in early diagnosis and better management.

In this study 23.1% patients had history of GDM in their previous pregnancy. A study in Germany by Schaefer-Graf showed that 10% of GDM cases had previous history which was a little lower than the present study. GDM patients had significantly higher frequency of family history of DM (57.7%) in this study. Another study conducted by Silva showed that 56.4% of GDM cases had family history of DM which is quite similar to our study.

Various maternal complications of GDM patients were noted in this study. Among them 11.6% had polyhydramnios, 3.8% had pre-eclampsia, 7.7% had vulvovaginitis and 15.4% had UTI. A study in India conducted by Jindal (2001) revealed that the incidence of polyhydramnios was 28% in the GDM patients. Marked dissimilarity was detected between two studies. Though polyhydramnios was significantly higher in Jindal's study, infection was common in our study.

During antenatal period 27% patients were treated with diet plus lifestyle modification and 69.2% patients were treated with diet plus insulin. Giuffrida (October 2003) in Brazil showed that 50.27% got diet plus insulin which is comparable with the current study.

In this study GDM patients had higher frequency of caesarean section than vaginal delivery (76.9% vs 23.1%). But dissimilarities were seen between our study and Jindal's study (2001 India) where caesarean section was required in 44% cases. In this study the rate of caesarean section is higher as it is a tertiary level hospital where most of the complicated cases are referred.

In this current study, most of the babies (80.8%) were born with normal birth weight (2.5-4 kg) which is comparable with the study done by Silva where 90% of baby had normal birth weight.

In our study there was no neonatal death. Among neonates of GDM mothers, 7.7% had hypoglycemia, 15.4% had hyperbilirubinemia, 1.9% had IUGR, 1.9% had respiratory distress syndrome and 73.1% had no complications. The study conducted by Silva revealed a dissimilar data which showed hyperbilirubinemia, hypoglycemia and RDS in 3.8%, 4.0% and 2.6% respectively with no neonatal death.

There is a difference between other international studies because the present study was conducted at a very short period of time with limited funds, most of the patients came with labor pain or some other complication, no control group was taken. If the study group could be followed up for a longer time, the result would have higher validity.

**Conclusion**

GDM is one of the most important medical and endocrine disorders encountered in the obstetric practice. It is crucial to detect women with GDM as the condition is associated with diverse range of adverse maternal and neonatal outcomes. In addition, having a history of GDM puts the mother at risk for the development of type 2 diabetes mellitus or recurrent GDM. From the study it is understood that if diabetes is well controlled it is no longer a barrier to pregnancy. At the same time a
diabetic mother has a fair chance of delivering healthy baby, provided the management is started from the preconception period. Adequate blood sugar control before and during pregnancy reduces the incidence of congenital anomalies, maternal and fetal morbidity and mortality. However, recognizing GDM is becoming a major health challenge for clinicians and treating it results in lowering of both maternal and fetal complications. Also, clinicians must follow-up women with GDM postpartum so that the prevalence of Type 2 diabetes may start declining. The maternal and fetal outcome depends upon the care by the committed team of endocrinologist, obstetricians and neonatologists. A short term intensive care gives a long term pay off in the primary prevention of obesity, impaired glucose tolerance (IGT) and diabetes in the offspring, as the preventive medicine starts before birth.

References
Role of Lipid Profile and BMI in The Evaluation Of Newly Diagnosed Type 2 Diabetes Mellitus

S Saber¹, Md Hossain², Ma Hossain³, MM Hossain⁴

Abstract:
Type 2 diabetes mellitus (T2DM) is the most prevalent metabolic condition and one amongst major health and socioeconomic problems worldwide. It represents more than 90% of total prevalence of diabetes in the world and is responsible for 9% of the global mortality per year. The abnormal lipid profile observed in type 2 DM is said to be related to insulin resistance which has been closely associated with diabetic dyslipidemia, hypertension and enormous risk of vascular diseases. Obesity is considered as part of the metabolic syndrome in the pathogenesis of type 2 diabetes. Newly detected type 2 diabetic patients in Medicine and Endocrinology departments of Bangladesh Medical College and Hospital (BMCH), Dhaka were the target population and those who fulfilled the inclusion and exclusion criteria were enrolled as the study sample. Out of 200 cases, 82 were males and 118 were female patients. Most of individuals were obese, females more than males. Most individuals had poor glycemic control. In this study maximum number of cases (94%) had serum HDL-C in low range and only 6% of cases were in high group. Prevalence of low HDL-C was 94%. Female diabetic patients had low HDL-C compared to males, which is an important risk factor for Coronary Heart Disease (CHD). This study has revealed that BMI abnormalities, dyslipidemia, uncontrolled glycemic status were highly prevalent in newly diagnosed type 2 diabetes mellitus. Most of our patients had dyslipidemia irrespective of glycemic control. Female patients had high frequency of low HDL-C, which is an important risk factor for CHD.

(Sir Salimullah Med Coll J 2018; 26: 31-36)

Introduction:
Type 2 diabetes mellitus (T2DM) is the most prevalent metabolic condition and one amongst major health and socioeconomic problems worldwide.¹⁻³ It represents more than 90% of total prevalence of diabetes in the world⁴ and is responsible for 9% of the global mortality corresponding to 4 million deaths per year. Untreated diabetes may result in limb amputation, blindness, kidney failure and neuropathy. T2DM is also associated with 4-fold increased risk of cardiovascular events and risk factor for cardiovascular death.⁵⁻⁷

Obesity is considered as part of the metabolic syndrome in the pathogenesis of type 2 diabetes. Body mass index (BMI) has gained favor as a better measure for adiposity (⁸, ⁹) than that is frequently used as a measure for body fatness in large epidemiological studies.¹⁰

The abnormal lipid profile observed in type 2 DM is said to be related to insulin resistance which has been closely associated with diabetic dyslipidemia, hypertension and enormous risk of vascular diseases.¹¹ Dyslipidemia characterized by the elevation of plasma total cholesterol (TC), triglycerides (TG) and TG-rich very-low-density lipoprotein cholesterol (VLDL-C), reduced high-density lipoprotein cholesterol (HDL-C), and increased low-density lipoprotein cholesterol (LDL-C) contributes significantly to the excess risk of CVD.¹² It has been observed that HDL may be the best predictor of Coronary Artery Disease (CAD) in T2DM followed by TG and total cholesterol.

Methodology:
This descriptive cross sectional study was done in the Department of Medicine, and Endocrinology of Bangladesh Medical College Hospital, Dhaka during the period from 1st July 2015 to 30th June 2017.

1. Dr. Sadia Saber, Asst. Professor (cc) of Medicine, BMC,
2. Dr. Md. Dabir Hossain, Asso. Professor of Medicine, BMC,
3. Dr. Amir Hossain, Asso. Professor of Cardiology, BMC.
4. Dr. Mohammad Monower Hossain, Medical Officer of Medicine, BMCH.

Address of Correspondence: Dr. Sadia Saber, Asst. Professor (cc) of Medicine, BMC, E-mail: sadiasaber201477@gmail.com
Study Population:
Newly detected type 2 diabetic patients in Medicine and Endocrinology departments of Bangladesh Medical College and Hospital (BMCH), Dhaka were the target population and those who fulfilled the inclusion and exclusion criteria were enrolled as the study sample.

Inclusion Criteria:
1. Newly diagnosed DM on the basis of ADA criteria
2. Age more than 20 years
3. Informed written consent.

Exclusion Criteria:
1. Previously known diabetic patient
2. Patients with coexisting hypothyroidism, liver disease, nephrotic syndrome, pregnancy, alcoholism, infections, cerebrovascular accident
3. Patients with known inherited disorders of lipids
4. Any severely ill patients whose sensorium and higher functions are altered
5. Medical conditions like multiple myeloma that may interfere with laboratory estimation of lipid profile.

Sampling Technique:
Consecutive convenient (purposive) sampling.

Data Collection:
Data were collected in a pre-designed data collection sheet designed for the study.

Procedure of data collection:
All newly detected type 2 diabetes mellitus, inpatient and outpatient fulfilling the criteria were included in this study.

Data Analysis:
After collection of all information, these data analysis was performed using the SPSS/PC software and graph and chart by MS excel.

Quantitative data were expressed as mean and standard deviation.

Qualitative data were expressed as frequency, percentage, proportion and ratio. Statistical analyses will be done by using appropriate statistical tool like ‘chi-square’ test, student’t’ test, where applicable. A P value of <0.05 was considered statistically significant and a P value of >0.05 (p>0.05) was considered statistically not significant.

Results:
Out of 200 cases, 82 were males and 118 were female patients (Figure 1). Maximum numbers of patients were in between the age group 35 to 45 years (Table 1, Figure 2). Most of individuals were obese, females more than males (Table 2). Most individuals had poor glycemic control.

![Pie chart showing sex distribution among study population](image1)

In our cases maximum numbers of cases were in between 35-44 years (33%) and 45 – 54 years (30%). Mean age was 51.69 +/- 11.184 years.

![Glycemic control among cases](image2)

Table I
Comparison of BMI between male and female

<table>
<thead>
<tr>
<th>Variables</th>
<th>Gender</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bmi</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>24.72+/-3.82</td>
<td>26.33+/-4.62</td>
<td>0.069</td>
</tr>
</tbody>
</table>

Compared to males, females were more obese (24.72+/-3.82 vs. 26.33+/-4.62) which is not statistically significant (Table 1).

In this study maximum number of cases (35%) had fair glycemic control, 23% had good control and 21% of cases were in each poor and very poor group (Figure 2).
In this study maximum number of cases (38%) had serum cholesterol in desirable range, 35% of cases were in borderline high and 27% cases were in high group. Prevalence of hypercholesterolemia was 62% with no significant difference between male and female patients (Table II).

In this study maximum number of cases (37%) had serum TG in normal range, 33% of cases were in high, 20% of cases were in borderline high, and only 7% cases were in very high group. Prevalence of hypertriglyceridemia was 63% with no significant difference between male and female patients (Table II).

In this study maximum number of cases (29%) had serum LDL-C in near optimal range, 28% of cases were in borderline high range, 24% of cases were in optimal range, only 8% cases were in very high group. Prevalence of raised LDL-C was 76% (Table IV).

In this study maximum number of cases (94%) had serum HDL-C in low range and only 6% of cases were in high group. Prevalence of low HDL-C was 94%. Female diabetic patients had low HDL-C compared to males with statistically significant difference, which is an important risk factor for Coronary Heart Disease (CHD) (Figure 3).

There was no statistically significant difference between male and female for raised TC, TG, LDL-C, but HDL-C was low in female than male which was statistically significant (p < 0.05) (Table V).

### Table II
**Difference in serum cholesterol (TC)**

<table>
<thead>
<tr>
<th>Cholesterol (mg%)</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desirable: &lt;200</td>
<td>32(39.0)</td>
<td>44(37.3)</td>
<td>76(38)</td>
</tr>
<tr>
<td>Borderline high:</td>
<td>30(36.6)</td>
<td>40(33.9)</td>
<td>70(35)</td>
</tr>
<tr>
<td>200-239</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High: &gt;240</td>
<td>20(24.4)</td>
<td>34(28.8)</td>
<td>54(27)</td>
</tr>
<tr>
<td>Total</td>
<td>82</td>
<td>118</td>
<td>200(100)</td>
</tr>
</tbody>
</table>

In this study maximum number of cases (38%) had serum cholesterol in desirable range, 35% of cases were in borderline high and 27% cases were in high group. Prevalence of hypercholesterolemia was 62% with no significant difference between male and female patients (Table II).

### Table III
**Differences in serum Triglycerides**

<table>
<thead>
<tr>
<th>Triglycerides (mg%)</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal: &lt;150</td>
<td>36(43.9)</td>
<td>38(32.2)</td>
<td>74(37)</td>
</tr>
<tr>
<td>Borderline high:</td>
<td>12(14.6)</td>
<td>28(23.7)</td>
<td>40(20)</td>
</tr>
<tr>
<td>150-199</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High: 200-499</td>
<td>26(31.7)</td>
<td>46(39.0)</td>
<td>72(33)</td>
</tr>
<tr>
<td>Very high: &gt;500</td>
<td>8(9.8)</td>
<td>6(5.1)</td>
<td>14(7)</td>
</tr>
<tr>
<td>Total</td>
<td>82</td>
<td>118</td>
<td>200(100)</td>
</tr>
</tbody>
</table>

In this study maximum number of cases (37%) had serum TG in normal range, 33% of cases were in high, 20% of cases were in borderline high, and only 7% cases were in very high group. Prevalence of hypertriglyceridemia was 63% with no significant difference between male and female patients (Table II).

### Table IV
**Difference in serum LDL cholesterol**

<table>
<thead>
<tr>
<th>LDL Cholesterol (mg%)</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimal: &lt;100</td>
<td>20(24.4)</td>
<td>28(23.7)</td>
<td>48(24)</td>
</tr>
<tr>
<td>Near optimal: 100-129</td>
<td>28(34.1)</td>
<td>30(25.4)</td>
<td>58(29)</td>
</tr>
<tr>
<td>Borderline high:</td>
<td>22(26.8)</td>
<td>34(28.8)</td>
<td>56(28)</td>
</tr>
<tr>
<td>High: 160-189</td>
<td>8(9.8)</td>
<td>14(11.9)</td>
<td>22(11)</td>
</tr>
<tr>
<td>Very high: &gt;190</td>
<td>4(4.9)</td>
<td>12(10.2)</td>
<td>16(8)</td>
</tr>
<tr>
<td>Total</td>
<td>82(100)</td>
<td>118(100)</td>
<td>200(100)</td>
</tr>
</tbody>
</table>

In this study maximum number of cases (94%) had serum HDL-C in low range and only 6% of cases were in high group. Prevalence of low HDL-C was 94%. Female diabetic patients had low HDL-C compared to males with statistically significant difference, which is an important risk factor for Coronary Heart Disease (CHD) (Figure 3).

### Table V
**Dyslipidemia in male and female diabetic patients**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Male</th>
<th>Female</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raised Total Cholesterol &gt; 200mg/dl</td>
<td>247.9 +/- 45.1 (n = 25)</td>
<td>240.2 +/- 30.1 (n = 37)</td>
<td>0.422</td>
</tr>
<tr>
<td>Raised TG &gt; 150mg/dl</td>
<td>330.3 +/- 213.3 (n = 23)</td>
<td>273.58 +/- 141.8 (n = 40)</td>
<td>0.21</td>
</tr>
<tr>
<td>Raised LDL-C &gt;100mg/dl</td>
<td>136.52 +/- 30.7 (n = 31)</td>
<td>144.93 +/- 32.0 (n = 45)</td>
<td>0.256</td>
</tr>
<tr>
<td>Low HDL-C &lt; 40mg/dl</td>
<td>33.61 +/- 4.8 (n = 18)</td>
<td>39.42 +/- 6.3 (n = 50)</td>
<td>0.001</td>
</tr>
</tbody>
</table>
A total 200 newly detected type 2 diabetes mellitus cases were studied. Out of 200 cases, 82 were males and 118 were females. Maximum numbers of patients were in between age group 35 to 45 years with mean total age 51.69 +/- 11.18 years. The mean age in this study was slightly less compared with other studies. Females were more than males in this study and results were as same as study done in Malaysia.

The age of newly detected type 2 diabetic patients observed to be more than 40 years confirmed earlier works that proves the age plays a significant role in the risk of developing type 2 diabetes mellitus especially after 40 years.

Most of the patients were obese. Females had higher BMI (26.33 +/- 4.62) when compared to males (24.72 +/- 3.82). This study has identified higher BMI as an association with newly detected type 2 diabetes mellitus and the role of BMI has been previously described.

In the present study, plasma glucose concentration was increased with increasing BMI and the percentage of poorly controlled diabetes was increased with increasing BMI which means that poorly controlled diabetes were more in obese patients than non-obese patients. It is well documented that the higher levels of fat prevent the action of insulin or down regulate its receptors and so produce insulin resistance state that leads to type 2 diabetes mellitus.

Dyslipidemia was found in 74% newly detected type 2 diabetic patients studied, which is similar to prevalence found in other studies like 79.1% in Lagos in Nigeria and 80.3% in South Africa. According to National Cholesterol Education Programme (NCEP), 97% of adults with diabetes have one or more lipid abnormalities while the prevalence of diabetic dyslipidemia varies from 25% to 60% in other studies. This variation in prevalence may be due to differences in BMI and possibly genetic variations.

A study conducted in Nish tar Hospital, Multan by Ahmed et al showed that 41% patients with type 2 diabetes had raised total cholesterol (>200mg/dl) and 61.2% patients have raised triglycerides in serum (>150mg/dl). The values of serum TG in this study are consistent with above mentioned study. The reason for difference in serum cholesterol values may be due to difference in the dietary habits of the people at Multan and Lahore.

Earlier studies have shown that higher triglycerides and low HDL-C in type 2 diabetes mellitus are independent on the degree of obesity. This is inconsistent with this study, while laakso and pyorala stated that obesity (BMI) effects on serum lipids and lipoproteins were more in diabetics than in non-diabetic subjects which is consistent with present study Garg stated that the severity of obesity is a determinant of lipoprotein abnormalities in type 2 diabetes besides the degree of glycaemic control.

There are studies which seem to suggest that lipoprotein distribution in type 2 diabetes mellitus is not significantly altered by the degree of glycaemia.

There was no significant difference between male and female for raised TC, TG, and LDL-C but low HDL-C was more in females than in males, which was statistically significant (p < 0.05). Same results were found in Malaysian and Iran study showed no significant difference in HDL-C but drawback of this study was inclusion of patients on hypolipidemic

### Table VI

<table>
<thead>
<tr>
<th>Variable</th>
<th>Correlation with HbA1c</th>
<th>Inference (direct or indirect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raised Total Cholesterol &gt;200mg/dl</td>
<td>r = -0.041; p = 0.753; (n = 62)</td>
<td>Inverse but no significant correlation</td>
</tr>
<tr>
<td>Raised TG &gt; 150mg/dl</td>
<td>r = 0.101; p = 0.431; (n = 63)</td>
<td>Direct but no significant correlation</td>
</tr>
<tr>
<td>Raised LDL-C &gt; 100mg/dl</td>
<td>r = 0.058; p = 0.620; (n = 76)</td>
<td>Direct but no significant correlation</td>
</tr>
<tr>
<td>Low HDL-C &lt; 40 mg/dl</td>
<td>r = 0.005; p = 0.0967 (n = 68)</td>
<td>Direct but no significant correlation</td>
</tr>
</tbody>
</table>

Raised TG, raised LDL-C and low HDL-C were directly correlated but raised TC was indirectly correlated with HbA1C which were statistically not significant (Table VI).
drugs. The prevalence of dyslipidemia was increased with increasing BMI levels in both sexes, which is consistent with study of Brown et al. \textsuperscript{27} The reported prevalence of dyslipidemia varied from 25 to 60%. \textsuperscript{28} This wide variation could be attributed to the studied population and the glycemic control as well as to the variation in the definition of the “cut off” values for lipid profile parameters.

Low HDL-C was a common associated finding with raised serum TG, serum cholesterol, and LDL-C. The findings of Kannel, et al. Jarrett et al. and Barette et al.\textsuperscript{28} were also consistent with this study.

The most frequent dyslipidemia entity in newly detected type 2 diabetics in this study was reduced HDL-C (94%) which is similar to previous research works.\textsuperscript{29} This same pattern was also observed in African-American diabetics studied in USA using ADA criteria.\textsuperscript{30} Life style, environment, occupation and level of education may account for these differences.\textsuperscript{31}

The abnormal lipid profile observed in type 2 diabetes mellitus is said to be related to insulin resistance as reported in previous studies, which leads to increased release of free fatty acids from fatty tissue, impaired insulin dependent muscle uptake of free fatty acids and increase fatty acid release to the hepatic tissue which has been closely associated with diabetic dyslipidemia, hypertension and enormous risk to vascular diseases.\textsuperscript{31}

In this study there was no significant difference of dyslipidemia between good and poor glycemic control, but one Indian study\textsuperscript{31} showed significant difference.

The study has documented several lipid abnormalities in newly detected type 2 diabetes mellitus and has pointed to the significance of diabetic management in the control of overweight and obesity is of importance.

**Conclusion**

This study has revealed that BMI abnormalities, dyslipidemia, uncontrolled glycemic status were highly prevalent in newly diagnosed type 2 diabetes mellitus. Most of our patients had dyslipidemia irrespective of glycemic control. Female patients had high frequency of low HDL-C, which is an important risk factor for Coronary Heart Disease. It is therefore recommended that every type 2 diabetic patients should have a fasting lipid profile and BMI measurement and treated appropriately to reduce the risk of Coronary Heart Disease.

**Limitations Of The Study**

The present study did not represent the actual scenario of the status of BMI and lipid profile in newly diagnosed type 2 diabetic patients in Bangladesh because the study was conducted in one tertiary level hospital (Bangladesh Medical College and Hospital (BMCH) in Dhaka city only.

1. Sample size and duration of the study was short.
2. Treatment outcome cannot be assessed because of lack of follow up.

**Acknowledgements**

Department of Medicine and Endocrinology, Bangladesh Medical College Hospital. I want to express my deepest respect to all newly diagnosed type 2 diabetic patients who were participated spontaneously in this study.

**References:**


Association of Microalbuminurin with Severity of Coronary Artery Disease in Non-diabetic Myocardial Infarction Patients - A Review

Md. Shafiqur Rahman Patwary¹, Md. Daharul Islam², Ranajit Sen Chowdhury³, Mohammad Mamoon Islam⁴, Md. Abdul Kader Akanda⁵, Durba Halder⁶

Abstract:
Coronary artery disease (CAD) is a major cause of death and disability in both developed & now in developing countries. CAD is a multifactorial disorder with several different risk factors. Advancing age, male sex, hypertension, diabetes mellitus, cigarette smoking and dyslipidemia are the major and independent well known risk factors for CAD. Atherosclerosis, chronic inflammation and endothelial dysfunction are major driving force underlying the initiation of atheromatous plaques, their unstable progression. Conditions which are accompanied with impaired endothelial function (for example, hypertension, dyslipidaemia, vascular disease, inflammation, etc) also may present as impaired glomerular endothelial function (changed permeability), such that microalbuminuria (MAU) represents a state of vascular endothelial dysfunction, with the kidney being a window to the vasculature in other tissue parts. So, endothelial dysfunction due to chronic inflammation in atherosclerosis has been suggested as association of microalbuminurin with myocardial infarction patients and it is considered indicator of severity of vascular dysfunction. Studies have shown that microalbuminuria (MAU) is an independent risk factor for cardiovascular diseases.

Key Words: Microalbuminuria, Coronary artery disease and Myocardial Infarction.

(Sir Salimullah Med Coll J 2018; 26: 37-40)

Introduction
Coronary artery disease (CAD) is a major cause of death and disability in both developed and developing countries¹. The burden of CVD, especially the CAD is increasing at a greater rate in South Asia than in any other region globally. Among the NCDs, CVD is probably the most important cause of mortality and morbidity in Bangladesh². According to the Health Bulletin 2017³, CVDs have an age-standardized mortality rate of 411 per 100,000 people. CVDs and hypertension have been showing an increasing trend. Advancing age, male sex, hypertension, diabetes mellitus, dyslipidemia and cigarette smoking are the independent risk factors for CAD⁴, but they do not entirely explain the variation in cardiovascular disease incidence and mortality. Therefore, additional risk factors have been proposed to better identify patients potentially at risk for CAD, and urinary albumin is a promising candidate. Since the first description in 1974⁵, the presence of subclinical increases in urinary albumin excretion has attracted attention, but much remains to be understood about the role of microalbuminuria (MAU) in non-diabetic individuals.

Myocardial infarction (MI)
Myocardial infarction (MI) is a major cause of mortality and morbidity worldwide. Each year, an estimated 785,000 persons will have a new MI in the United States alone, and approximately every minute an American will succumb to one. In addition, MI has major psychological and legal implications for patients and the society and is an important outcome measure in research studies. The prevalence of MI provides useful data regarding the burden of coronary artery disease and offers...
insight into health care planning, policy, and resource allocation. The Third Universal Definition of Myocardial Infarction (MI) expert consensus document was published in October 2012 by the global Myocardial Infarction Task Force. The detection of a rise and/or fall of cardiac biomarkers, with at least one of the values being elevated (>99th percentile upper reference limit, or URL), is central to the third universal definition of MI. The highly sensitive and specific cardiac troponin (cTn) is the preferred biomarker of myocardial necrosis. In addition, one of the five following predefined criteria should be satisfied before a diagnosis of MI is made: (1) symptoms of myocardial ischemia; (2) new (or presumably new) significant ST-segment/T-wave changes or left bundle branch block; (3) development of pathological Q waves on ECG; (4) new loss of viable myocardium or regional wall motion abnormality by imaging; (5) identification of intracoronary thrombus by angiography or autopsy. The third global MI task force maintains that the electrocardiogram (ECG) is an integral part of the diagnostic work-up in patients with suspected MI and should be obtained and interpreted in a timely manner.

Clinical classification of myocardial infarction: For the sake of immediate treatment strategies, such as reperfusion therapy, it is usual practice to designate MI in patients with chest discomfort, or other ischemic symptoms that develop ST elevation in two contiguous leads, as an ‘ST elevation MI’ (STEMI). In contrast, patients without ST elevation at presentation are usually designated as having a ‘non-ST elevation MI’ (NSTEMI). Many patients with MI develop Q waves (Q wave MI), but others do not (non-Q MI). Patients without elevated biomarker values can be diagnosed as having unstable angina.

**Albuminuria**

In general, urinary albumin excretion is classified as normoalbuminuria (<30 mg/day or ACR <30 mg/g), microalbuminuria (30–300 mg/day or ACR 30–300 mg/g), and macroalbuminuria (>300 mg/day or ACR >300 mg/g). Normal urinary albumin excretion is <30 mg/day. The term MAU is defined as urinary albumin levels equal to 30 · 300 mg/24 h in 24-h urine collection or albumin/creatinine ratio (ACR) of > 30 · 300 mg/g creatinine in random spot urine sample. It is a surrogate marker for endothelial dysfunction and is independently associated with atherosclerosis in diabetic and non diabetic patients. Endothelial dysfunction precedes morphological atherosclerotic alterations and has a major action in lesion progress and simultaneously affects the glomerular endothelial dysfunction. Conditions which are accompanied with impaired endothelial function (for example, DM, hypertension, vascular disease, inflammation, and insulin resistance) also may present as impaired glomerular endothelial function, such that micro albuminuria represents a state of vascular endothelial dysfunction, with the kidney being a window to the vasculature in other tissue parts. In summary patho-physiological processes associated with MAU are manifold: Local changes in the kidneys such as increased intraglomerular capillary pressure, increased shunting of albumin through glomerular membrane pores and loss of glomerular membrane charge; systemic changes include activation of inflammatory...
mediators, increased transcapillary escape rate of albumin and vascular endothelial dysfunction. So microalbuminuria developed in MI patients and albuminuria may be important factors determining the occurrence and the severity of CAD.

In healthy individuals, the normal range for urinary albumin excretion rate is less than 30 mg/day. Urinary albumin excretion rate is known to increase with exercise, oral protein intake, urinary tract infection, and pregnancy. Albuminuria of 300 mg/day or more indicates nephropathy. Data from several studies over the last two decades have demonstrated that MAU is not only a predictor of diabetic complications but also a powerful independent risk factor for coronary artery disease (CAD), moreover, MAU predicts development of ischemic cardiovascular events related to the development of atherosclerosis. Microalbuminuria is prescient unrelated to conventional risk elements of cardiovascular diseases and entire reasons of death in diabetes or hypertension patient groups and in the general population. It is gaining importance as a marker of atherogenic milieu and indicates the target organ damage and can be a valuable tool in screening and identification of patients with cardiovascular disease. In a study reported that patients with MAU have more severe angiographically detected CAD than those without MAU, and MAU exhibits a significant association with the presence and severity of CAD.

Another study demonstrated that patients with MAU had much greater atherosclerotic burden in the form of multivessel CAD than patients without it, and this was especially true in patients with overt diabetes. The mechanism of accelerated atherosclerosis in MAU is uncertain. Abnormal vasodilation, endothelial dysfunction, inflammation, insulin resistance, or abnormal coagulation may be involved. Another study reported that significant Microalbuminuria was found in patients of myocardial infarction who were non diabetic and non-hypertensive. The mortality and morbidity in short term outcome was also significantly increased in patients having MAU, indicating the significance of Microalbuminuria as powerful prognostic biomarker. So it is concluded that microalbuminuria may have an association with myocardial infarction in absence of traditional risk factors like Diabetes and Hypertension.

Conclusion
Multiple studies shows significantly high microalbuminuria levels found in non diabetic MI patients. The results of the various studies indicate that non diabetic patients with microalbuminuria have more extensive and complex angiographic CAD compared to those without microalbuminuria. Since the MAU is simple and relatively inexpensive investigation, early identification of MAU may influence the aggressiveness of management and ultimately the outcome of disease.

References


Outpatient Laparoscopic Cholecystectomy: Five Years Experience in Hepatobiliary & Pancreatic Surgery Division in BSMMU


Abstract

Background: Outpatient Laparoscopic Cholecystectomy (OLC) performed in Hepatobiliary & Pancreatic Surgery Division of Bangabandhu Sheikh Mujib Medical University (BSMMU), indicated mainly for non-complicated gall stone disease and gall bladder polyps should influence tertiary hospitals in the country to spread out this practice.

Method: During the five years period from July 2013 to June 2018, Laparoscopic Cholecystectomy (LC) was performed in the evening OT of Hepatobiliary & Pancreatic Surgery Division of Department of Surgery of Bangabandhu Sheikh Mujib Medical University (BSMMU) on Outpatient basis. Established inclusion criteria, the one that is followed worldwide for ‘Day Case’ LC was followed for patient selection for Outpatient Laparoscopic Cholecystectomy (OLC) which includes: ASA (American Society of Anesthesiology) classes I and II; age: 18 – 60 years; body mass index (BMI) < 30 kg/m²; patient acceptance and cooperation (informed consent). Patients suffering from acute cholecystitis or who have/‘had previous history ofJaundice and preoperative abnormal LFTs were deemed not suitable for having the surgery in an outpatient setting. All the OLC was performed by faculty members or under direct supervision by senior residents. Peroperative details were noted and every resected sample was sent for histopathological examination. Discharge was aimed to be within 36 hours of performing the surgery and 1st follow-up was advised on 7th post-operative day (POD) in the Hepatobiliary Outdoor and 2nd follow-up at 3 months after operation. There after follow-up schedule was tailored according to the status of the patient. Evaluation was done about the success rates of doing OLC and outcome of the procedure (readmissions, morbidity and mortality, further treatment, overall satisfaction, safety etc.)

Results: A total of 124 patients underwent OLC with 116(93.5%) patients suffering from symptomatic gallstone disease, 5(4.03%) from asymptomatic gallstone disease and 3(2.42%) from gall bladder polyp. Male: Female ratio was 1: 2 with a mean age of 42±13.3. Pre anesthetic checkup showed 91(73.4%) patients were in ASA II class and 33(26.6%) were in ASA I. Conversion rate was 0%. Post-Operative Nausea & Vomiting (PONV) was the most concerning issue in the immediate post-operative period and 28(22.6) % cases experienced PONV. All cases got discharged within 36 hours. In the 1st Follow-up at 7th POD 23 (18.5%) cases were found to have minor complications; port-site serous discharge in 9(7.25%) cases, Pain in the right upper quadrant of abdomen referred to right shoulder tip in 12(9.7%) cases and abnormal LFTs in 2(1.61%) cases; all of which resolved spontaneously. 1 case was readmitted due to retained stone in the CBD which was later treated with ERCP stone extraction. 110(88.7%) cases were overall satisfied by the treatment provided through OLC.

Conclusions: The study definitely speaks for OLC to be a clinically effective low-cost, low-hazard treatment procedure for carefully selected patients between age 18-60 when performed in a teaching hospital by or in presence of faculty surgeons.

Key Words: OLC, Outpatient Surgery, Laparoscopic Surgery.

(Sir Salimullah Med Coll J 2018; 26: 41-46)
Introduction
Laparoscopic cholecystectomy (LC) is the “Gold Standard” surgical technique accepted worldwide for managing gall stone disease and simple gall bladder polyps.1,2 In recent years, advancement in technical skills and anesthetic procedures have rendered this procedure to be performed in an outpatient basis, where proper patient selection and judicial attempt at surgery can make it an safe and acceptable approach, advocated by many authorities.3-8.

Key factors to be noted while thinking of performing OLC are immediate post-operative complications like postoperative nausea & vomiting (PONV) which is found to be higher in many series and chance of presence of some complications like bleeding and bile duct injury. However, with careful case selection and by adopting meticulous surgical techniques OLC can be safely done.8-10 Besides clinical effectiveness and cost saving, OLC also favors treatment in resource scarce settings where limited number of hospital beds are mostly occupied.9-14.

In Bangladesh, outpatient cholecystectomy is gradually gaining acceptance from surgeons and patients. Likewise, in our Hepatobiliary & Pancreatic Surgery Division with limited bed facility and a very long queue of patients to-be-admitted, we opted to perform OLC with proper patient selection and surgical technique. The aim of the study is thus to evaluate the outcome of outpatient LC (OLC) in a university hospital, confirming the safety and effectiveness.

Materials and Methods
Hundred and Twenty-four patients who underwent OLC for gall stone disease and gall balder polyp with curative intent between July 2013 and June 2018 were carefully analyzed. [Patient Selection] Patients with USG-documented Gall Stone Disease or Gall Bladder Polyp were selected for OLC with utmost care, following a strict inclusion criteria: i) ASA (American Society of Anesthesiology) physical status classification classes I and II. ii) Age between 18 and 60. iii) Body Mass Index (BMI) < 30 kg/m² iv) Patient who accepted OLC and consented for having OLC. Acute Cholecystitis and jaundice or previous history of jaundice or previous history of altered Liver Function Tests (LFTs) was the exclusion criterion due to possible need of increased hospital stay and also due to the increased chance of conversion. Similarly patients with previous abdominal surgery and dilated bile ducts at USG were also excluded. [Patient Assessment & Preparation] All patients were assessed uniformly very carefully before surgery to check compliance with the inclusion criteria and rechecked again during preanesthetic checkup, the day before surgery, by checking complete blood count, random blood sugar, serum creatinine, LFTs (total bilirubin, alanine transaminase, alkaline phosphatase, prothrombin time) chest x-ray, pulmonary function test when required, ECG and echocardiogram. Oral midazolam 7.5 mg was prescribed in the night before surgery to reduce stress and patients were advised to attend the hospital in the morning for rechecking of the status. Patients were maintained nothing per oral 6 hours prior to the procedure and was asked to attend the evening OT. [Per-operative Care] Broad Spectrum Antibiotic (as per Antibiotic Guideline of Bangabandhu Sheikh Mujib Medical University; from December 2015), single dose was given detected induction. Standard 4-port Laparoscopic Cholecystectomy was performed while ensuring Critical View of Safety (CVS) to avoid bleeding or bile duct injury; Calot’s identification was documented taking picture in each cases. Antegrade (Calot’s-first) dissection was approached preferably. In cases where adhesiolysis, bile leakage from gall bladder wall or bleeding dictated- an appropriate sized silicon drain was kept laparoscopically in the Morrison’s pouch. Analgesic soln. (10 ml of 0.5% bupivacaine admixed with 10 ml Normal Saline) was infiltrated in the skin, fascia and muscle layer of the trocar sites before closure. Duration of operation was noted duly. [Postoperative Care] Intravenous Broad Spectrum Antibiotic (as per Antibiotic Guideline of Bangabandhu Sheikh Mujib Medical University; from December 2015) as per dosage schedule was given in the night of operation and till patient is allowed oral liquid when oral formulation was prescribed in the postoperative period. Post-Operative Nausea & Vomiting (PONV) was assessed and noted; any further subjective complaints were also duly noted in each cases; Postoperative Pain was given due respect; Inj. Pethidine at 1-2mg/kg body weight was given to each patient ,in the recovery room,when the patients came around and one single dose of diclofenac suppository was given at night.
All patients were ensured of general care in the following morning of operation (oral care, sips of water, respiratory exercise, early mobilization) in the post-operative ward. Awake, oriented, mobilized patients who are well tolerating oral fluids; passing adequate urine; having no pain (responsive to oral analgesics), no nausea and vomiting and with stable general condition seen in the evening of 1st POD (after 24 hours of OLC) were given discharge with advice to attend 1st Follow-up in the Hepatobiliary Outdoor with CBC and LFTs after 7 days. Follow-up was done by clinical examination and reported investigations on an outpatient basis one week and 3 months after operation. Thorough Evaluation was done about the success rates of OLC including postoperative outcome and patient’s overall satisfaction.

**Results**

<table>
<thead>
<tr>
<th>Demographic data</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>42±13.3</td>
</tr>
<tr>
<td>Female</td>
<td>83/(66.9)</td>
</tr>
<tr>
<td>Male</td>
<td>41/(33.1)</td>
</tr>
<tr>
<td>ASA Grade</td>
<td></td>
</tr>
<tr>
<td>ASA- I</td>
<td>33/(26.6)</td>
</tr>
<tr>
<td>ASA-II</td>
<td>91/(73.4)</td>
</tr>
<tr>
<td>Indication for OLC</td>
<td></td>
</tr>
<tr>
<td>Symptomatic gallstones</td>
<td>116/(93.5)</td>
</tr>
<tr>
<td>Gallbladder polyp</td>
<td>3/(2.42)</td>
</tr>
<tr>
<td>Asymptomatic gallstone</td>
<td>5/(4.03)</td>
</tr>
<tr>
<td>Mean Operating time(Minute)</td>
<td>43±15.1</td>
</tr>
<tr>
<td>Conversion Rate</td>
<td>1.61%</td>
</tr>
<tr>
<td>Drains Used</td>
<td>17/(13.7%)</td>
</tr>
<tr>
<td>Successful Discharge within 36 hours</td>
<td>115/(92.7%)</td>
</tr>
<tr>
<td>Postoperative follow up till following morning</td>
<td>28/(22.6%)</td>
</tr>
</tbody>
</table>

**Discussion**

Newer anesthetic tools and techniques in collaboration with skillful surgical techniques have made OLC a popular practice in the advanced countries. Many studies have shown that in proper setting OLC can be both safe and cost-effective.\(^{15-18}\) To ensure this proper setting implementation of standard inclusion criteria for OLC is a must. In our series attaching to the strict inclusion criteria was associated with a 92.7% discharge rate in the following morning.

A total of 124 patients underwent OLC during the five years period while a total of 496 laparoscopic cholecystectomies were performed, giving the inclusion rate of OLC to be 25%. Female preponderance prevails with 1:2 ratio, the mean age of presentation 42±13.3 (range 24-58 years). The findings correlates very well with other series.\(^{19-27}\)

Mean operative time for OLC in our series is 43±15.1 minutes. The time taken for senior residents to perform meticulously was higher than the cases done by faculty surgeons. Though the operative time correlates well with the reported studies yet with experience this time can be lessened.\(^{25-7}\)

In our series, most of the patients i.e., 116(93.5%) patients were suffering from symptomatic gallstone disease, 5(4.03%) from asymptomatic gallstone disease and 3(2.42%) from gall bladder polyp. The finding is profoundly similar with reported studies; the reason for this is that, in most of the studies where OLC is evaluated the almost similar inclusion criteria is followed.\(^{15-27}\)

No conversion to open cholecystectomy was needed and no mention worthy peroperative complications. OLC’s were either performed by trained surgeons or under direct supervision of trained senior surgeons. Strictly following standard criteria for selection during inclusion rendered this significantly reduced conversion rate which is true for all sorts of Laparoscopic Cholecystectomy.\(^{18}\)

Post-Operative Nausea & Vomiting (PONV) was the most concerning issue in the immediate postoperative period and 28(22.6) % cases experienced PONV. All cases got discharged within 36 hours. In the 1st Follow-up at 7th POD 23 (18.5%) cases were found to have minor complications; port-site
serous discharge in 9(7.25%) cases, Pain in the right. Upper quadrant of abdomen referred to right. Shoulder tip in 12(9.7%) cases and Abnormal LFTs in 2(1.61%) cases; all of which resolved spontaneously. 1 case was readmitted due to retained stone in the CBD which was later treated with ERCP stone extraction. 110(88.7%) cases were overall satisfied by the treatment provided through OLC.

124 patients were selected for OLC (Outpatient laparoscopic cholecystectomy) during the period when a total number of 496 laparoscopic cholecystectomies were performed, giving a inclusion rate of 25% for OLC. 66.9% patients were female. Mean age of the sample was 42±13.3 (range 24–64) years. Mean operative time for OLC was 43±15.1 minutes that correlates very well with other studies. Seventeen patients (13.7%) had drain inserted. Moderate to severe peri-cholecystic adhesion was present in 9 cases and accidental Gall Bladder injury happened in 8 cases which demanded for drains as per the judgment of the performing surgeons. In all cases drain output was carefully measured in the following morning when in all cases only minimal collection was found and subsequently drains were removed. Placement of drain in our case is higher than published studies. The performing surgeons mindset to-be-in-the-safe-side might be the reason behind this higher rate of drain insertion.

Inadvertent or missed bleeding from the liver bed or slipped cystic artery or bile duct injury are trivial concerning complications after LC which is suggested to be avoided by adopting proper dissection technique; in our series standard dissection technique was ensured and there was no postoperative bleeding or bile duct injury.

In the 1st Follow-up at 7th POD 23 (18.5%) cases were found to have minor complications; port-site serous discharge in 9(7.25%) cases, Pain in the right. Upper quadrant of abdomen referred to right. Shoulder tip in 12(9.7%) cases and Abnormal LFTs in 2(1.61%) cases; all of which resolved spontaneously, gradually within 3 weeks with continued oral antibiotic and oral analgesics and follow-up.

Readmission rate found in other series is around 2% in several studies, while in our series only one patient (0.81%) developed jaundice with in 7th POD and in USG was found to have a retained stone in the CBD. Her preoperative LFTs’ and imaging did not show evidence of any ductal dilatation. She was readmitted and underwent ERCP stone extraction.

Post-Operative Nausea & Vomiting (PONV) is the most concerning issue in the immediate post-operative period after OLC. PONV associated with ambulatory surgery accounts for 0.1 - 0.2% of unanticipated admissions. In our series somewhat high rate of PONV is noted; 28(22.6) % cases experienced PONV and intravenous ondansetron single dose was given to combat PONV. Marinis et al, in their series of 110 cases of day case laparoscopic surgery reported no case suffering from PONV. Namely three protocols ; i) propofol for induction ii) avoidance of NO iii) prophylactic ondansetron (4 mg IV, at the end of LC) and adequate hydration favored Marinis Et al. to combat PONV.

Postoperative pain is a key influential factor for the success of OLC, proper pain control is essential and obligatory for patient satisfaction. Various drug regimen is proposed by many authors to combat postoperative pain to ensure early mobilization and satisfaction for the outpatient procedures. Like many other studies, trocar site infiltration of local anaesthetics was found quite effective to combat port-site pain. Inj. Pethidine at 1-2mg/kg body weight; given in the postoperative ward when the patients came around and one single dose of diclofenac supposirory given at night was sufficient for post-operative pain management in our series.

Hundred and fifteen patients (92.5%) were discharged within 36 hours of performing OLC. 9 cases had a prolong stay at the post-operative ward due to PONV and pain abdomen but none required admission and all cases were discharged within 72 hours.

Patient satisfaction rate is the key variable for the study and in our series overall patient satisfaction rate was 88.7%. In reported series satisfaction rate between 85%-90% is observed worldwide; which correlates very well with our study and is the most significant components of success of OLC.
Conclusion
Our study demonstrates outpatient Laparoscopic Cholecystectomy (OLC) to be an admissible procedure for treating gall stone disease and gall bladder polyp in tertiary hospitals of the country. The patient satisfaction can approach acceptable if strict inclusion criteria, standard dissection (operative) technique and judicial perioperative measures are practiced.

References


Review Article

Procalcitonin: An Early Marker for Diagnosis of Neonatal Sepsis

Jesmin Akter¹, Sunirmal Roy², Rehena Akter³, Nasir Hossain⁴, Md. Moniruzzaman Bhuiyan⁵, Md. Zahir Uddin⁶, Md. Abdul Mannan⁷

Abstract

Sepsis is the common cause of neonatal mortality. It is responsible for about 30-50% of the total neonatal deaths in developing countries. It is estimated that up to 20% of neonates develop sepsis and approximately 1% die of sepsis-related causes. Sepsis-related mortality is largely preventable with timely recognition, rational use of antimicrobial therapy, aggressive supportive care and preventive measures. Early diagnosis of neonatal sepsis is difficult solely on the basis of physical findings because signs are not specific and may be absent when the infection is identified just after delivery. Definitive diagnosis of neonatal sepsis is based on blood culture which takes at least 24-48 hours and often falsely negative. Several serum biomarkers have been identified in recent years with potential uses to help diagnose local and systemic infections; differentiate bacterial from viral or fungal infection and guide antibiotic therapy. Currently, there are at least 178 serum biomarkers that have potential roles in the management of patients with infection and 34 have been studied specifically for diagnosis of sepsis. The serum biomarker that has been most extensively studied recently is procalcitonin, current literature suggest that it may prove to be most useful biomarker for infection. This review provides an overview of different published studies that assessed procalcitonin as an early marker of infection than more frequently used CRP.

Key Words: Sepsis, Procalcitonin, review

(Sir Salimullah Med Coll J 2018; 26: 47-51)

Introduction

Procalcitonin (PCT), a precursor of calcitonin is a 116 amino acid protein secreted by C cells of thyroid gland in normal situation and is the propeptide of calcitonin hormone and has no hormonal activity.¹ Its level may increase during septicaemia, meningitis, pneumonia and urinary tract infection. Macrophage and monocyte cells of various organs such as liver, lungs, kidney, adipocytes and muscle cells are the potential sources of procalcitonin.²,³ It was initially described as a potential marker of bacterial sepsis.⁴ It was shown in healthy volunteers that PCT was detectable in the plasma two hours after the injection of endotoxin, increasing to a plateau in 6-8 hours and then decreasing to normal after 24 hours.⁵,⁶ Procalcitonin is degraded by specific protease into three peptides namely kalacelcin, calcitonin and aN-terminal fragment and half life of procalcitonin is 24-30 hours. In severe bacterial infection and sepsis, macrophage and monocyte cells of various organs such as liver are believed to be involved in the synthesis and release of PCT in response to bacterial infections.⁷ There are some evidence that procalcitonin is more specific for bacterial infections with serum level rising and falling more rapidly in bacterial infection. Serum level of procalcitonin were recognized to be elevated in patient with infection in early 1990 and since that time numerous studies have investigated the potential roles of procalcitonin for diagnosis and management of local and systemic infection.⁸,⁹ Its level may increase during septicaemia, meningitis, pneumonia and urinary tract infection. Macrophages and monocytes of various organs, such as liver, lungs, kidney, adipocytes and muscle cells are the potential sources of PCT in severe bacterial infection and sepsis.¹⁰,¹¹ In bacterial infection, PCT increases from concentrations in the picogram range. In normal adult PCT level is 250 pg/ml and in normal neonates up to 48 hours after birth it is 600 pg/ml. But in local or systemic bacterial infection possible, PCT value is ≥ 250 to <500 pg/ml and progress to

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sepsis it is > 500 to <2000 pg/ml and in sepsis the value is ≥ 2000 to < 10,000 pg/ml and in septic shock, PCT value is > 10,000. The increase levels of PCT often correlates with the severity of disease and mortality. Increases in PCT occur more rapidly than increases in CRP. Procalcitonin can be detected in the plasma 2 hours after the injection of endotoxins. Within 6-8 hour PCT concentrations rise and a plateau is reached after approximately 12 hour.  

**Compare of PCT with CRP**

* C-reactive protein (CRP) has been used for many year as marker of infection but its specificity has been challenged. Procalcitonin has been proposed as a more specific and better prognostic marker than CRP although its value has also been challenged.

  * Compared to CRP, PCT has better diagnostic and prognostic value and will clearly distinguish viral and bacterial infection. C-reactive protein (CRP) is a good marker for diagnosis of neonatal sepsis. Estimation of CRP levels are potentially useful in this respect. CRP is the most extensively used and investigated acute phase reactant and synthesized by the liver. It can be considered as a specific but late marker of neonatal infection. It cannot be used to differentiate between bacterial and other infection. CRP level rises 12-24 hours of infection and remain elevated for 3-7 days. It is a disadvantage that CRP increases after 48 hours of infection. Elevated CRP levels are seen in infection, in autoimmune disease, in surgery, mucronin aspiration syndrome and recent vaccination.

Procalcitonin has been proposed as a marker of bacterial sepsis in critically ill patients. Procalcitonin levels increase in severe sepsis and its plasma concentration is related the patients clinical condition. Serum procalcitonin levels appeared to correlate with the severity of microbial invasion.

In localized bacterial infections, severe viral infections and inflammatory reactions of noninfectious origin do not or slightly increase procalcitonin level. The increase level of procalcitonin (PCT) has been observed before the rise in CRP. The unique feature that PCT is increase in bacterial and fungal infections but remain unchanged even in severe viral infections and other inflammatory diseases, make PCT attractive as a potential diagnostic variable for the diagnosis of bacterial infection. The measurement of procalcitonin is reliable and so can be used for early and rapid diagnosis of systemic infection in neonates in a short period of time. This review provides an overview of different studies published in different journal that assessed PCT as a marker of bacterial infection and seeks to answer the question whether PCT is more reliable and an early marker for bacterial infection than more frequently used CRP.

**Related previous works**

Procalcitonin as an early diagnostic marker of sepsis. The evaluation of tests for neonatal sepsis is important because the infection may present a very serious threat to the baby. There is an urgent need to know whether the baby has sepsis to initiate treatment as quickly as possible. Confirmation of the diagnosis may take time and diagnostic tests are used to obtain a rapid identification of the infectious status.

Extensive literatures exist on single laboratory test or combination of tests as well as tests together with risk factors and or clinical signs to diagnose neonatal sepsis. There is no single reliable test for the early diagnosis of neonatal sepsis, therefore there is a continuing search for a new infection marker.

Early diagnosis of neonatal sepsis is complicated because the first signs of the disease may be minimal, and are similar to those of various noninfectious processes. Furthermore, blood culture results are not available until at least 48-72 hours after the specimen reaches the laboratory. Definitive diagnosis of sepsis is based on positive blood culture or cerebro-spinal fluid (CSF) culture and both take at least 24-48 hours and are often falsely negative. Empirical antibiotic therapy is therefore started immediately when neonatal infection is suspected. Determination of leukocyte count, C-reactive protein, elastase and cytokines have role to establish or rule out neonatal infection.

In 1993, Assicot and colleagues reported high concentration of PCT (Procalcitonin) in sera of children during septic conditions. PCT also seemed to correlate with the severity of microbial invasion and decreased rapidly during antibiotic therapy. Since 1993, many studies have assessed the use of PCT as a marker of bacterial infection in adult, children and neonates.
M I Aboud et al. conducted a prospective case control study to evaluate PCT as a marker of neonatal sepsis in intensive care unit. They found that serum level of PCT was more reliable marker than serum level of CRP.25

The usefulness of PCT was assessed by Lopez and their colleagues as a marker of neonatal sepsis of vertical transmission in neonates admitted to the 13 neonatology unit over one year. They conclude that serum PCT concentration showed a moderate diagnostic reliability for detection of neonatal sepsis.26

In a study, Koksal et al concluded that serum PCT level was superior to serum CRP level in terms of early diagnosis of neonatal sepsis, in detecting the severity of the illness and in evaluation of the response to antibiotic treatment.27

The role of serum PCT and CRP in the diagnosis of neonatal sepsis was assessed by NaherBS and their colleagues in Bangladesh. They found that PCT was a sensitive, independent and useful biomarker of neonatal sepsis and it correlated with the severity of infection.28

Cinzia Auriti et al. evaluated the utility of PCT as a diagnostic marker for nosocomial neonatal sepsis and compared the results of PCT with those of the most widely used test for sepsis among 20 neonates with sepsis and 20 controls aged 4-30 days. It was found that for PCT sensitivity 85%, specificity 80% and for CRP sensitivity 80%, specificity 95%. They concluded that PCT could be a useful marker for diagnosis of nosocomial neonatal sepsis.29

In another study done by Sucilathangam et al (2012) compared PCT and CRP an early diagnostic markers for neonatal infection. This study showed that serum PCT was superior to serum CRP level in terms of early diagnosis of neonatal sepsis. The PCT concentration was elevated in culture positive neonates. These findings supported the usefulness of the PCT to establish the diagnosis of neonatal sepsis.29

The study of Zahedpaspasha et al. (2009) in Iran showed that PCT levels were remarkably high in neonatal sepsis and the levels dropped dramatically after treatment with antibiotics.30

In one study done by Daynia E Ballot et al. (2004) showed that PCT was significantly related to the category of infection and not sufficiently reliable to be the sole marker of neonatal sepsis. PCT would be useful as a part of neonatal sepsis evaluation.31

J Blommendahl et al. conducted a study for comparison of PCT with CRP and differential white blood count for diagnosis of culture proven sepsis. They showed that serum PCT concentration, serum CRP and blood immature to total neutrophil leucocyte ratio all had reasonable sensitivity (58-77%), reasonable specificity (62-84%), good negative predictive value (94-97%) and poor positive predictive value (16-24%) for diagnosis of sepsis.12

Pierrakos and Vincent reviewed 3370 studies retrieved from PubMed database using the key words “sepsis” and “biomarker” in sepsis. They found that more than 170 different biomarkers had been assessed for potential use in sepsis, more for prognosis than diagnosis. None had sufficient specificity or sensitivity to be routinely employed in clinical practice.9,18

PCT has been intensively investigated for its diagnostic role in neonatal sepsis. It has been reported that high concentration of plasma PCT was found in infants with severe infection, while PCT levels were very low in those with no infections. Many authors found that procalcitonin is a promising marker for the diagnosis of neonatal sepsis.4,32,33

In a recent study Koksal et al. concluded that serum PCT level was superior to serum CRP level in terms of early diagnosis of neonatal sepsis, in detecting the severity of the illness and in evaluation of the response to antibiotic treatment.27 The usefulness of PCT was assessed by Lopez Sastre and their colleagues as a marker of neonatal sepsis of admitted to 13 neonatology unit in Spain over one year. They concluded that serum PCT concentration showed a moderate diagnostic reliability for detection of neonatal sepsis from the time of infection.26

Sakha et al. investigated the role of PCT in the diagnosis of neonatal sepsis and its correlation with the CRP. The sensitivity, specificity, positive predictive value and negative predictive value of PCT (more than 2000 pg/ml) were 66.7%, 50%, 28.6%, 83.3% and those of CRP (more than 3.5 mg/L) were 70.4%, 72.2%, 43.2% and 89% respectively in diagnosis of neonatal sepsis.34 Ballot et al. studied 52 neonates with possible infections. Only 13 neonates had a definite infection, in whom the sensitivity and the negative predictive value of serum
PCT was 89.5% and 95% respectively. But they stated that although PCT was significantly related to the category of the infection, it was not sufficiently reliable to be the sole marker of neonatal sepsis. PCT would be useful as a part of the full sepsis evaluation, but it is relatively expensive. A negative PCT on presentation may rule out sepsis. Boo et al. showed in 18 neonates among 87 infants with confirmed sepsis, based on the positive blood culture results, at a PCT cut-off level of greater than or equal to 2000 pg/ml. The sensitivity and specificity, PPV and NPV were 88.9%, 65.2%, 40% and 95.7% and that for CRP, they were 55.6%, 89.9%, 58.8% and 88.6% respectively.

So, PCT can be used as a good tool for the diagnosis of neonatal sepsis. PCT is highly specific for bacterial infection and help differentiating it from viral infection. It correlates well with the progression and the severity of the infection. PCT helps in avoiding antibiotic therapy where it is not required and thereby reducing the cost and the occurrence of bacterial resistance. PCT can also be employed for the prognosis of sepsis.

**Conclusion**

This review summarizes the use of procalcitonin as an early and more reliable marker of bacterial infection in neonate results in better overall sensitivity, specificity than CRP and is a valuable additional tool for the diagnosis of bacterial disease in this age group. The benefits of measuring serum PCT routinely in the diagnosis and follow up of neonatal sepsis is to reduce hospital cost. Such benefit might support a wider acceptance of the test in routine practice.

**References**

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