Orginal Article

Comparative Study of Urinary Albumin Excretion in Pre-Eclamptic Women in Different Duration

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Abstract

Pre- eclampsia is one of the important causes of maternal death in developing countries like Bangladesh. The analysis of 24 hour urine for protein excretion remains the best method of monitoring proteinuria in pregnancy. 24 hour urine collection is notoriously difficult to obtain when repeated analysis is needed in pre-eclamptic women .With this back ground, this study was carried out in BSMMU and DMCH from November 2004 to January 2005 to determine whether 12 hours urine collection for measuring albumin excretion in pre-eclamptic women can be a substitute for 24 hour collection. This study was performed on 40 women with pre-eclampsia who were admitted to the hospital. In each patient urinary albumin concentrations in two 12 hours samples (12 hour day and 12 hours night samples) were measured against the standard 24-hour albumin excretion. It was found that albumin concentrations in the 12-hour day and 12-hours night collections were close to the concentrations of the 24-hour collection.

Introduction

Hypertension complicates at least 5-8 percent of all pregnancies.[1]Among the hypertensive disorders of pregnancy the highest risks are associated with pre-eclampsia and eclampsia.[2] Pre-eclampsia is an important cause of both perinatal and maternal morbidity and mortality.[3] Hypertension is a sign of an underlying pathology which may be pre-existing or appears for the first time during pregnancy.[4] Clinically, pre-eclampsia is characterized by the onset of hypertension, proteinuria and oedema usually beginning in the third trimester.[5]

A small amount of protein 200-300 mg/24 hour is normally excreted in the urine and this amount are probably not increased in pregnancy.[6] A loss of >300 mg/24 hour suggest a disease process.[7] Proteinuria is a late feature but is an important sign of preeclampsia and detecting proteinuria is an integral part of the management of hypertensive pregnant women. The presence of proteinuria is required for the diagnosis of pre-eclampsia[8,9] and is associated with a higher rate of maternal and foetal complica tion among hypertensive pregnancies.[10,11] Similarly chronic hypertension with superimposed preeclampsia is associated with a higher risk than is stable chronic hypertension during pregnancy.[12] Proteinuria is extremely valuable as a prognostic sign in preeclampsia. Frequent monitoring of the amount of protein excreted in the urine must be a part of the evaluation of these patients. A significant increase in proteinuria indicates that the disease has worsened.[13] Weekly estimation of 24 hours protein excretion is the part of management of preeclampsia in inpatient care.[14] The collection of urine over 24 hours how ever is inconvenient, time consuming and errors due to incomplete collections and spillage are common. Moreover it is difficult waiting 24 or more hours to know whether proteinuria is truly present.[15]Several authors have advocated shortened timed clearances to alleviate the problems of 24 hours urine collection. Brodows et al.[16] Recommended 3 hours collections. Cook.[17] used overnight collection and Sochett and Odnoman.[18] found 1-hour timed collections satisfactory. This shorter timed urine collection for detecting proteinuria can be tried in pre-eclamptic women. However for pregnant women, particularly during continuous bed rest in hospital the circadian variation in albumin excretion is smaller or absent and it may therefore be possible to use shorter collection period.[19] A recent study was performed by Helle Kieler with thirty women of preclampsia in Uppsala University Hospital, Sweden, on 2003. He showed that the gold standard of 24 hours urinary excretion for assessment of albuminurea in pre-eclamptic women can be substituted with a 12 hours collections.[20] It will be a great advantage if reliable measurement of protein excretion could be obtained from a shorter collection period. The most commonly used screening tests for detecting proteinuria is the 'stix' test. It is particularly sensitive for albumin, but has a low sensitivity for other proteins such as globulin and Benzones protein.[21] According to KUO et al. ipstick urine analysis cannot be relied on either to detect or to exclude the presence of proteinuria in pregnant women.[22] It has been found that the albumin excretion in urine correlates significantly to the albumin/creatinine ratio during pregnancy.[23]

Materials and method

This prospective study was carried out in the Department of Obstetric and Gynaecology, Bangabandhu Sheikh Mujib Medical University, and Dhaka Medical College Hospital, during the period of 01.11.04 to 28.02.05.Among the admitted patient total 40 pregnant women with pre-eclampsia was taken with proper selection criteria. The criteria for inclusion were hypertension (140/90 mmHg or more) after 20th week of gestation and a bed side urine albumin positive. Detailed medical and obstetric history was taken and thorough examination was done and all the information's were recorded in the pre-designed data

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collection sheet. Before collection of urine all women were carefully instructed about the study and an informed verbal consent was taken. Two clean, dry and graduated plastic containers with 10 ml of toluine as preservatives in each were given to the patient for collection of urine. In one container urine was collected from 8.00 am to 8.00 pm which was called 12 hours day collection. In another container urine was collected from 8.00 pm to the next day 8.00 am which was called 12 hours night collection. 5 ml of urine from 12 hours day and 5 ml of urine from 12 hours night collections were taken in two dry, clean test tube which was called 12 hours day and night urine samples respectively. Then the urine in the day and night containers were mixed to form a 24 hour urine collection. 5 ml of urine from mixed collection was taken in test tube no.-3 which was called 24 hours urine sample. Three urine samples in three test tubes (test tube no.-l = 12 hours day sample, test tube no.-2 = 12 hours night sample and test tube no.-3 = 24 hours urine samples) were sent to the Biochemistry laboratory of BSMMU for analysis of proteinuria. Mean and median value of each of the urine samples was measured and median differences were calculated. Median difference between 24 hour urinary albumin and 12 hours day and night sample were calculated.

Results

Table-I: Age distribution of patients.

Age group (in years)	Total No. of patient n=40	Percentage (%)
16-20	10	25
21-25	12	30
26-30	11	27
31-35	6	15
36-40	1	2

Table-II: Socio-economic status.

Socio-economic status n=40	Number of patient	Percentage (%)
Lower		50
Middle	15	37.5
Upper	5	12.5

Table-III: Distribution of parity.

Parity	No. of patient n=40	Percentage (%)
Prime	26	65
1-3	10	25
>3	4	10

Table-IV: Distribution of patients upon aking antihypertensive drug.

Have taken antihypertensive	No. of patient n=40	Percentage (%)
Yes	38	95
No	2	5

Table-V: Distribution of the patients having family history of hypertension/pre-eclampsia.

Family history	No. of patient n=40	Percentage (%)
Hypertension	11	27.5
Preeclampsia	4	10
No comments	25	62.5

Table-VI: Gestational age at the time of admission

Gestational age	No. of patient n=40	Percentage (%)
22-28	10	25
29-35	25	62.5
36 or more	5	12.5

Table-VI: Gestational age at the time of admission

Gestational age	No. of patient n=40	Percentage (%)
22-28	10	25
29-35	25	62.5
36 or more	5	12.5

Table-VII: Weight gain during pregnancy.

B.P in early pregnancy in mmHg	No. of patient n=40	
	Mean	SD
Systolic	112.75	13.20
Diastolic	70.63	10.20

Table-IX: Distribution of B.P at the time of admission

B.P on admission in mmHg	No. of patient n=40	Percentage (%)
	Mean	SD
Systolic	166.38	20.38
Diastolic	102.88	9.93

Table-X: Distribution of urinary albumin concentration in three samples.

Number of patients (n=40)	Mean ±SD mg/L	Median mg/L
A	1744.90±513.26	1635
B	1768.35+510.08	1689
C	1757.63±549.92	1640

Table-XI: Median difference of albumin concentration in three samples.

Number of patient	n=40	Median difference
C - A		10 mg/L
C - B		-7.5 mg/L
A - B		- 20 mg/L

Table-XII: Comparison of urinary albumin excretion in the different samples.

Number of patient n=40	P Value[3]
Group A vs. B	>0.10 ns
Group A vs. C	>0.50 ns
Group B vs. C	>0.50 ns

Discussion

Pre-eclampsia is a serious complication of pregnancy and are responsible for significant morbidity and mortality in the foetus, the newborn infant and mother. It is important to detect the condition as early as possible. Albuminuria is an important sign of pre-eclampsia and repeated urine analysis to screen for the condition are part of the standard antenatal care; detecting proteinuria in pregnant women is usually done by routine visual dipstick urinalysis. However recent studies have documented inaccuracies of this method, giving high false positive and false negative results, when compared with the gold standard of 24 hour urine measurement. When pre-eclampsia with persistent albuminuria develops, urinary albumin excretion is monitored by frequent 24 hour urine samples. The purpose of this surveillance was that increased albumin excretion is a sign of aggravation of pre-eclampsia and reflects serious nephropathy; massive albumin excretion may result in planned preterm delivery. Obtaining a complete 24 hour Urine collection is difficult, is inconvenient, time consuming and errors due to incomplete collections and spillage are common. In the present study, we have tried to overcome the difficulties of 24 hour urine collection by a shorter collection period. In this study, in women with pre-eclampsia who had significant albuminuria, we found good agreement between urinary albumin concentrations measured in samples collected for 12 hours and the traditional 24 hours collection. This is in accordance with the observation made by the Dr. Helle Kieler et al .in a prospective study in the Department of women's and children's health, Obstetric and Gynaecology, Uppsala University Hospital, Sweden, measured urinary albumin excretion in 30 women with pre-eclampsia. He concluded that the gold standard of 24-hour urinary excretion for assessment of albuminuria in pre-eclamptic women could be substituted with a 12-hour collection. He also observed that spot urine samples were inaccurate and is therefore not recommended for quantification of albumin excretion. He showed that the median difference between the 24 hour and 12 hour day urinary albumin excretion was -3 mg/L which was 10 mg/L, in our study and the median differ ence between the 24 hour and 12 hours night urinary albumin excretion was 17 mg/L which was -7.5 mg/L in our study. Our study showed that the agreement between albu min concentration in 24 hour and 12 hour night sample was slightly better than that of the 12 hour day sample (-5.7 mg/L vs. 10 mg/L) (17 mg/L vs. -3 mg/L in previous study).

Median difference in night sample over estimate the albumin concentration as indicated by the negative values for mean and median differences. Over estimation of albumin excretion may lead to interventions such as planned preterm delivery to be performed earlier than required. Under estimation of albumin excretion however, may delay detection of severe nephropathy resulting in damage to the kidney. Urinary albumin excretion is at least in diabetic patients known to have day to day variability; presumably, the same is true in pre-eclampsia. However, there is little likelihood that this biologic variability influences the results as all samples were collected within 24 hours period. In some studies urinary albumin/creatinine ratio is a valid estimate of albumin excretion rate. But other studies found that adding analysis of creatinine is of limited use and only increases the costs. As the increase in albumin excretion in severe pre-eclampsia, occurs rapidly and suddenly, frequent urine analysis are required. This analysis should be valid and easy to perform and should be as inexpensive as possible; a night sample collection starting at 8.00 pm and ending at 8.00 am is thought to be acceptable to women then a 24 hour collection. A shorter period should reduce the risk of incomplete collection.

Conclusion

In the present study we have observed that the difference between the urinary albumin excretion in 24 hour sample and 12 hour day and 12 hour night sample was statistically insignificant. This finding suggested that the 24-hour urinary excretion for assessment of albuminuria in pre-eclamptic women may be substituted with a 12-hour collection. Further study with a large number of patients is necessary to determine whether 12-hour urinary albumin excretion can be used for quantification of albuminuria in pre-eclamptic women.

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