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CLINICAL SIGNIFICANCE OF ASYMPTOMATIC BACTERIURIA DURING PREGNANCY

by

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Introduction

Obstetricians have known for many years that bacteriuria is not an unusual complication of pregnancy (Dodds 1931; Baird 1936). However, often due to its asymptomatic nature it escapes attention. Kass (1960) reported that 40% of women with bacteriuria developed acute pyelonephritis which could be prevented by the proper treatment in early pregnancy. Besides pyelonephritis, bacteriuria is known to be associated with hypertension, anaemia and an increase in the rate of prematurity and foetal mortality (Kass 1962; Giles and Brown 1962; Smith and Bullen 1965). The incidence of bacteriuria is also reported to be higher in patients suffering from toxaemia of pregnancy (Finnerty *et al* 1961). A study was therefore undertaken to determine the incidence of asymptomatic bacteriuria of pregnancy amongst the patients attending the obstetric service of the All India Institute of Medical Sciences, Delhi. An attempt was made to establish relationship of its incidence to the associated medical disorders of pregnancy.

Material and Methods

Two hundred and twenty-five women attending the antenatal clinic of the All India Institute of Medical Sciences were

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investigated for the presence of asymptomatic bacteriuria. The women were placed in 2 groups.

Group I: Two hundred of 12-22 weeks' gestation period who were symptom free at the time of their first visit.

Group II: Twenty-five women with pre-eclamptic toxaemia during the third trimester of pregnancy.

A patient was considered to be pre-eclamptic if any two of the following three clinical signs were present.

(i) Blood pressure 130/90 mm of Hg or above.

(ii) Albuminuria.

(iii) Oedema.

A detailed history was taken and a complete physical examination was carried out. Haemoglobin was estimated by Sahli's method and a woman was considered to be anaemic if the haemoglobin was less than 10 gm%.

Neither of these 225 patients gave a history of any urinary tract infection nor had received any antibiotics in the recent past.

Chemical, microscopic and bacteriological examination of the urine was carried out at the time of the initial visit and repeated after every 2 months till the time of delivery. When significant bacteriuria was detected in a patient, urine examination was carried out fortnightly upto 6-8 weeks postpartum. Chemical examination included the detection of albumin and sugar by the method of Miller (1960). Microscopic examination for pus cells and bacteriological cultures were done by the method of McGeachie and Kennedy (1963). Organisms repeatedly isolated in significant numbers i.e. 100,000 and more/ml of urine were labelled as the causative organisms and identified according to Cruickshank (1968). Sensitivity of the isolated organisms to antibiotics and chemotherapeutic agents was carried out by the dry disc diffusion technique (Cruickshank, 1968). The antibiotics and chemotherapeutic agents employed and their concentration were as follows.

Benzylpenicillin	100 units/disc.
Streptomycin sulphate	100 ug/disc.
Chloramphenicol	25 ug/disc.
Tetracycline hydrochloride	25 ug/disc.
Nitrofurantoin	100 ug/disc.
Methanamine Mandelate	5 mgm/disc.
Polymyxin B sulphate	1000 units/disc.

Patients with significant bacteriuria were divided into 2 groups. One group was left untreated and labelled as Control group. The other group was treated with short term antibiotic or chemotherapeutic agent depending on the sensitivity exhibited *in vitro* and labelled as Treated group. In case of failure of response to treatment, the organism was reisolated, its antibiotic sensitivity redetermined and a second short course of treatment given accordingly. If necessary a third course was also administered.

Intravenous pyelography was done 6-8 weeks postpartum for all those women who had bacteriuria for the detection of any pathology of the urinary tract.

The period of gestation and birth weight of each baby was recorded. If the baby was born before 37 weeks of gestation or weighed less than 2.25 kg at birth, it was considered to be premature.

Results

Asymptomatic bacteriuria was detected in 10 (5%) women of group I and 2 (8%) women of group II.

Types of Organisms Isolated

The organisms isolated repeatedly in significant numbers from the 12 patients is given in Table I. It is seen that *Esch.*

TABLE I
Organisms Isolated from Patients With Bacteriuria

Organism	Number of patients		
	Group I	Group II	
Esch. coli	3	2	41.5%
K. aerogenes	3	—	25.0%
Strep. viridans	2	—	16.7%
Staph. aureus	1	—	8.3%
Micrococcus	1	—	8.3%
Total	12		100%

coli was the commonest causative organism of bacteriuria, and the next common was *K. aerogenes*. There were seven primigravidae in this series and all of them harboured gram —ve bacilli.

Relation of Bacteriuria to Age

The incidence of bacteriuria was high in the age group 15-20 years, then there was a decline in the age group 21-30 years followed by a rise in the age group 31-40 years (Fig. 1).

Relation of Bacteriuria to Gravidity

The maximum incidence (8.61%) of bacteriuria was found amongst the primigravidae. The incidence was lowest (2.2%) amongst the 2nd and 3rd gravidae, but showed an upward trend in the grand multigravidae (Fig. 2).

Relation of Bacteriuria to Anaemia

Out of the 98 anaemic patients, 7 (7.1%) had bacteriuria. Wheras of the 127 nonanaemic patients, 5 (3.9%) had bacteriuria.

Relation of Bacteriuria to Toxaemia

Fifteen women of group I who were initially symptom free developed pre-eclamptic toxaemia during the course of the study bringing the total number of toxaemia patients to 40 (15 of group I and 25 of group II).

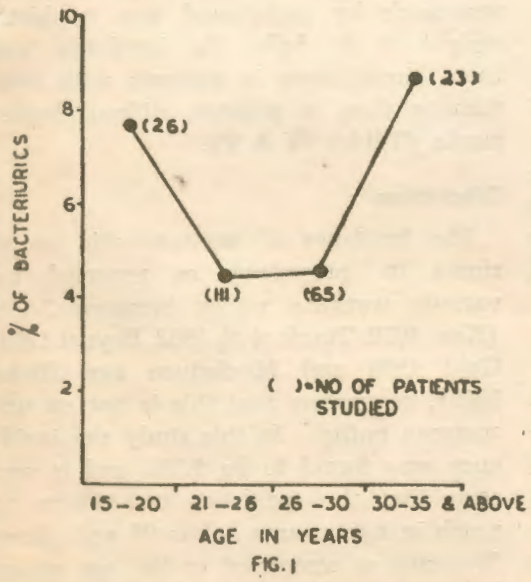

FIG. 1

Percentage of bacteriurics in various age groups.

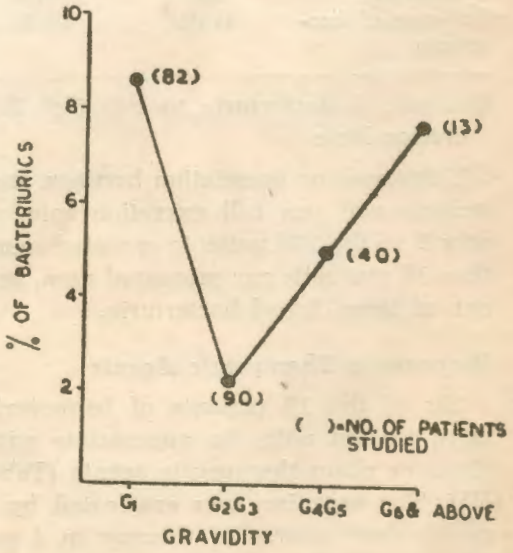

FIG. 2

Percentage of bacteriurics in relation to gravidity.

The incidence of bacteriuria in these patients was as follows.

A. *Without Toxaemia*

Number of patients	—	185
Bacteriuria	—	8
Incidence	—	4.32%

B. *With Toxaemia*

Number of patients	—	40
Bacteriuria	—	4
Incidence	—	10%

Relation of Bacteriuria to Albuminuria

The incidence of bacteriuria was more than double amongst the women with albuminuria than without albuminuria (Table II).

TABLE II

Relation of Bacteriuria to Albuminuria

Group	Albuminuria	No Albuminuria
Bacteriuric	2	10
Abacteriuric	16	197
Incidence of bacteriuria	11.1%	4.83%

Relation of Bacteriuria to Pus Cell Excretion Rate

There was no correlation between bacteriuria and pus cell excretion rate, as only 2 of the 225 patients excreted more than 10 pus cells per measured area, and one of these 2 had bacteriuria.

Response to Therapeutic Agents

Six of the 12 patients of bacteriuria were treated with the appropriate antibiotic or chemotherapeutic agents (Table III). The organism was eradicated by a single short course of therapy in 4 patients and by 3 short courses of therapy with 2 drugs in one more patient. However, one patient continued to harbour the organism in spite of 3 short courses of therapy with 2 drugs. A right renal calculus with hydronephrosis was visualised in the postpartum intravenous pyelogram of this patient.

It is interesting to note that both the cases which required more than one course of therapy were harbouring *Esch. coli.*

Out of six untreated patients with bacteriuria, 5 continued to harbour the same organism till the time of delivery (the sixth patient did not come to the hospital for delivery). In 4 of these 5 cases the Urine became sterile by 6 weeks postpartum, whereas the fifth patient (Case no. 5) showed signs of acute pyelonephritis 6 weeks postpartum. This patient was treated with chloramphenicol and urine culture done 8 weeks postpartum was sterile.

Gestation Age and Birth Weight of Infants at Delivery

Whether the assessment of prematurity was made by gestational age or birth weight of the baby, the incidence was three times more in patients with bacteriuria than in patients without bacteriuria (Tables IV & V).

Discussion

The incidence of asymptomatic bacteriuria in pregnancy as reported by various workers varies between 2-7% (Kass 1960, Turck *et al*, 1962, Bryant 1964, Gold 1966 and Macfadyen and Hicks 1969), suggesting that this is not an uncommon entity. In this study the incidence was found to be 5.3% and it was seen that the incidence was twice as much in age groups below 20 and above 30 years as compared to the age group between 20 and 30 years. It was also seen that the incidence was higher in primi-

TABLE III

Drugs Administered to the Treated Group

	Name of the patient	Organism isolated	Drugs administered
GROUP I			
1	M.D.	*K. aerogenes*	—
2	M.K.	*K. aerogenes*	Methanamine Mandelate
3	D.B.	*Esch. coli.*	—
4	K.K.	*Esch. coli.*	i. Streptomycin sulphate ii. Streptomycin sulphate iii. Methanamine mandelate
5	R.K.	*Strep. viridans*	—
6	N.D.	*Strep. viridans*	Streptomycin sulphate
7	B.P.	*K. aerogenes*	—
8	M.D.	*Micrococcus*	Methanamine Mandelate
9	V.D.	*Staph. aureus*	—
10	B.B.	*Esch. coli.*	Nitrofurantoin
GROUP II			
11	P.K.	*Esch. coli.*	—
12	A.M.	*Esch. coli.*	1. Methanamine Mandelate ii. Methanamine Mandelate iii. Streptomycin sulphate

— = Control. 6 = Treated. 6 = Untreated.

TABLE IV

Gestation Age in Weeks

Group	26-37 weeks	37-42 weeks	Total
Bacteriuric*	2	9	11
Abacteriuric	12	201	213

* One Bacteriuric patient failed to come for delivery.

TABLE V

Weight of the Babies

Group	Number of patients	Weight in Kilograms		
		1.25-2.25	2.25-3.25	3.25-4.25
Bacteriuric	11*	2 (18.1%)	8 (72.7%)	1 (9%)
Abacteriuric	213	13 (6.1%)	173 (81.2%)	27 (12.6%)

* One patient failed to come for delivery.

gravidae and grandmultigravidae. Similar results have been reported by Le Blanc *et al,* (1965) and Little (1966), though others like Kass (1960) and Norden (1970) have reported an increase in the incidence with age and parity.

Bacteriuria was detected in the first trimester in only 10 patients. In 2 cases who were infection free to begin with, bacteriuria developed during the second trimester. A single urine examination therefore does not necessarily exclude urinary tract infection.

The incidence of bacteriuria was higher (10%) in patients with pre-eclamptic toxaemia as compared to the patients who did not develop toxaemia (4.3%).

While no correlation was found between pyuria and bacteriuria, it was seen that the incidence of bacteriuria in patients with albuminuria was higher (11.1%) as compared to the 4.83% in women without albuminuria.

The incidence of bacteriuria was almost double in anaemic patients as compared to patients without anaemia. A culture of urine is therefore imperative in women with albuminuria and anaemia.

The incidence of premature babies born to mothers with bacteriuria was three times more (18%) than in mothers without bacteriuria (6%).

Of the 6 patients with bacteriuria who were treated, 5 responded to therapy. The remaining patient (Case 4) failed to respond in spite of 3 short course therapy. Intravenous pyelography done 6 weeks postpartum showed the presence of right renal calculus with hydronephrosis. A search should always be made for associated pathology in treatment failure cases.

During the course of this study it was observed that 2 out of 10 (20%) patients with bacteriuria developed pre-eclamptic toxaemia in the third trimester. As the estimated cost of diagnosing bacteriuria is approximately Rs. 7 per patient, this service should be made available to every pregnant mother.

Summary

The incidence and effects of asymptomatic bacteriuria of pregnancy were studied in 200 symptom free pregnant women and 25 women with pre-eclamptic toxaemia. The relationship to pre-eclamptic toxaemia, anaemia and prematurity was ascertained.

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