THE INCIDENCE AND CAUSATION OF GLYCOSURIA IN PREGNANCY *

Part I

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DURING the last two decades notable progress has been made in the knowledge of glycosuria in general and glycosuria during pregnancy in particular. It is realized nevertheless that this knowledge is far from being complete. However, adequate methods for the routine diagnosis and successful control of glycosuria during pregnancy have been found and developed so that advantage may be taken of them in the treatment of this condition.

Important and useful information on the aetiology of glycosuria has come at different times through a number of investigators and through improved methods of technique and advanced knowledge of anatomy, physiology, pathology as well as other sciences, particularly organic and biochemistry.

The glycosuria in pregnancy is however a problem of more recent investigation. Cammidge (1913) considered the sugar present in urine during the later months of pregnancy to be chiefly lactose but from further works by Joslin, Lawrence, Shir, Edward Allen, W. J. Dieckmann, Priscilla White, Addessi and others, it has been definitely established that the sugar so persistently present in urine during pregnancy is glucose and not lactose as was at one time supposed. Lactosuria in pregnancy according to Joslin (1935) is rare and according to him the incidence of glycosuria in pregnancy is increased when the pituitary prolactin of the blood is high.

Addessi (1936) opines that the threshold for glucose is lowered during pregnancy. This he believes is due to the increased tonus of the segment which innervates the kidney.

Lawrence (1939) in his book 'The Diabetic Life' says that temporary renal glycosuria is common in pregnancy after the 5th month. According to Shir (1939) alimentary and renal glycosuria are prone to develop after the middle of pregnancy and complicate the treatment of diabetes, when present.

Allen (1939) states the enlargement of the foetus (which is a common feature in diabetic cases) was noted even in non-diabetic glycosuria cases.

Lawrence (1940) stated that 'pregnancy often produced a temporary lowering of the renal threshold of glucose. It is common both in diabetics and non-diabetics. It is perhaps due

to an effect of changed pituitary activity or changed kidney function. The cause of this lowered threshold is still obscure'.

There is thus a divergence of opinion with regard to the causation of glycosuria during pregnancy. The cause of it is still obscure as has been well emphasized by Lawrence. Under these circumstances an investigation on the incidence and causation of glycosuria in pregnancy was undertaken.

Experimental

The experimental work on pregnant women was carried out on the out-patients attending antenatal clinic of the Nowrojee Wadia Maternity Hospital, Bombay, and on the in-patients attending the antenatal ward of that hospital. Investigation was also carried out on the out-patients of the Hospital for Women and Children, Tardeo, Bombay. The cases were selected exclusively from the free patients of the poor class attending these hospitals with the idea of getting a full co-operation in the conduct of the enquiry.

In all 540 cases were examined. Detailed history of each was taken. Particular attention was paid in noting the quality and quantity of diet of each patient. Specimen urine of each case was arranged to be collected 3 hours after the normal midday meal. Examination of the urine was made at the Biochemistry Laboratory of the Seth G. S. Medical College, Bombay. As this institution is opposite the Maternity Hospital, very little interval elapsed between the passing and examination of the urine. The urine was mainly tested for glucose and other abnormal constituents such as albumin, indican, lactose and acetone bodies. In order to differentiate between glucose and lactose fermentation, osazone tests were performed. Results are shown in the table and in graphs I to V.

Discussion

The incidence of glycosuria in the later months of pregnancy is higher and shows a gradual increase in graph I. The incidence of glycosuria among vegetarians and non-vegetarians is shown

Graph I.

Incidence of Glycosuria in different months.

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TABLE

Showing incidence of glycosuria and other abnormalities in different months of pregnancy

Month	CASES			PER CENT INCIDENCE OF GLYCOSURIA						OTHER ABNORMALITIES				
	Total	Vegetarian	Non-vegetarian	Total	Vegetarian	Non-vegetarian	Calcium		Vitamin C		Lactose	Albumin	Acetone	Indican
							Rich	Poor	Rich	Poor				
3	25	6	19	4.0	..	..	..	..	..	..	..	1	..	..
4	29	11	18	6.9	..	..	..	..	..	..	..	1	..	1
5	76	47	29	13.1	14.7	11.9	10.8	15.4	3.7	18.3	..	3	15	..
6	90	28	62	20.1	23.1	17.7	18.1	22.4	5.0	24.3	..	4	9	2
7	126	77	49	20.0	30.3	29.1	29.0	31.0	6.4	38.0	..	6	22	..
8	114	57	57	35.2	36.8	33.3	32.2	38.4	8.3	42.2	..	2	24	4
9	80	42	38	37.5	37.2	35.9	33.0	40.0	13.0	49.1	4	9	13	3

in graph II. It will be seen that there is some difference in incidence between vegetarians and non-vegetarians.

It must however be noted that the so-called non-vegetarians of poorer class of people in Western India take too little of animal diet per day. Those who take even 1 oz. of animal diet (meat or fish) per day (a very small quantity compared to the Western or European standards) have been classed as non-vegetarians. Otherwise, there would have been a greater difference in the incidence of glycosuria between the vegetarians and the non-vegetarians.

Among the poor section there are some whose cereal food consists mainly of rice and there are others who take wheat, millets, etc., in addition. Incidentally it was found that calcium rich food and calcium poor food made a difference. The incidence of glycosuria in cases taking a calcium poor cereal and calcium rich cereal is shown in graph III.

The difference is all the more marked from the 7th month onwards. According to Swanson and Iob (1939) the mineral intake, especially of calcium, gradually increases in a fetus from

Graph III.

Graph IV.

Graph V.

month to month from the 5th month onwards. Winkler and Fritsche (1939) have found the concentration of calcium in the foetal tissue to run parallel with the advancement of pregnancy. Thus, as the foetal demand increases there is a tendency to a decrease of calcium in the maternal blood unless an adequate calcium rich diet is taken.

Effect of vitamin C content of the diet is interesting. The incidence of glycosuria in cases consuming a vitamin C rich food is lower as compared to cases taking a vitamin C poor diet. The difference is seen in graph IV.

Fruits are taken as articles of diet rich in vitamin C and a pregnant woman who took one sweet lime (*Citrus medica* var. acid) or an orange (*Citrus aurantium*) or any other fruit containing an equivalent of over 50 mg. of vitamin C per day was classified as a case taking vitamin C rich diet.

It is true that fresh leafy vegetables are very rich in vitamin C, but the people of Bombay hardly get them fresh. Besides, the bulk of vitamin C in vegetables is destroyed in cooking. Frying and even boiling in the presence of plenty of oxygen (as is done by the poorer classes of people in Western India) lead to rapid and almost complete destruction of vitamin C. In graph V is shown the incidence of glycosuria in primipara, bipara, etc.

Summary

1. The reducing sugar so often found in the urine of pregnant woman is usually glucose. It is not lactose. The latter is not found until the 9th month of pregnancy and that too a few days before the onset of labour and its percentage is very small.

2. The incidence of glycosuria shows a gradual and a definite rise from month to month, as pregnancy advances.

3. The incidence is greater in the vegetarians than in the non-vegetarians.

4. This incidence is greater in cases taking calcium poor diet than in those taking calcium rich diet and the difference in this incidence is more pronounced in the last two months of pregnancy.

5. This incidence is far greater in cases taking a diet poor in vitamin C than in those taking a diet rich in this ingredient. The difference in this incidence becomes all the more pronounced in the last months of pregnancy.

6. This incidence is greater in subsequent pregnancies, i.e. the least in primipara, a little more in bipara, still more in third para and so on.

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PARENTERAL QUINACRINE IN MALARIAL FEVERS

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THE cases reported in this article were treated in the medical department of the Ludlow Jute Mills situated in village Chengail in the Howrah district. The village is situated on the north bank of river Hooghly about 17 miles from Calcutta. The patients were mainly the labour force employed by the Ludlow Jute Mills and Press, resident partly on company-owned premises and partly in the nearby villages. A small percentage was from among the dependants of the employees.