

HORMONAL CYTODIAGNOSIS OF PREGNANCY BY COLPOCYTOGRAM, UROCYTOGRAM AND NYMPHOCYTOGRAM

(A Comparative Study)

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Papanicolaou (1925) observed the hormonal changes during pregnancy by vaginal smear method, which is now considered reliable for the diagnosis of pregnancy by many workers like Pundel (1959) deNeef (1965), Teter Teter (1968) and Aikat (1973). Papanicolaou (1948) noticed the cytological uniformity between the vaginal and urinary sediment smears and advocated the use of the latter for the hormonal assessment. Many workers like Sora (1959) Lencioni (1963, 1969) O'Morchoe and O'Morchoe (1967) Pinto *et al* (1968) and Mitra *et al* (1974 and 1975) found parallelism in the hormonal shift by these two methods during pregnancy and considered the urinary cytology as an advancement over vaginal cytology. Del Castillo and Videla (1966) described a cycle of cellular desquamation from the inner surface of labia minora (Nymphae), similar to those of urinary and vaginal cycles.

The subsequent studies on nymphocytogram were done in relation to menstrual cycle and menopause. Pinto *et al* (1968) applied this method in pregnant women. Recently, Teter Teter (1968) studied the vaginal, vulval and urinary smears in pregnancy, utilising E.I. and K.P.I. for statistical comparison. In the present work a detailed study of hormonal cytology along with a comparative statistical evaluation of colpocytogram, urocytogram and nymphocytogram on the basis of K.P.I., M.V., C.C.I. and F.C.I. in pregnancy, has been carried out.

Material and Method

A total of 608 smears, including 253 vaginal, 253 vulval and 102 urinary smears were collected from 130 pregnant women, during the various phases of pregnancy. The vaginal smears were obtained from the upper third of the lateral vaginal wall and vulval smears from the inner surface of labia minora. The urinary sediment smears were prepared from the freshly voided urine by the technique of Lencioni (1969). A mixture of equal parts of 95% alcohol and ether was used as a fixative and the staining

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was done by the technique of Papanicolaou and Traut (1943).

Result

Infection was observed in 12.6% vaginal, 9.98% vulval and 1.9% urinary smears. All grades of bacterial flora and cytolysis were almost equally observed in the 3 types of smears. All the unsatisfactory smears along with a few, which showed heavy infection or marked cytolysis were not subjected to hormonal assessment.

In the vaginal smears the exfoliation was heavy and mainly consisted of superficial cells in the first trimester which were gradually replaced by the intermediate cells with marked curling, folding and heavy placard formation in the second trimester. This pattern persisted throughout the pregnancy till term in all the cases except in those which showed at term changes. The cells exfoliated from the labia minora, urinary bladder and urethra as regards to their morphology and staining characteristics were almost similar to those of the vaginal smear. The pattern of exfoliation was similar in the vulval but comparatively low and discrete in the urinary sediment smears through out the pregnancy.

In all the 3 type of smears the navicular cells appeared by the middle of first trimester and were few and isolated in the beginning but as pregnancy advanced these cells increased in number, decreased in size and were arranged in large clusters. The shape of some of the navicular cells was elongated and tadpole type in the urinary smears. The pregnancy cells appeared at 6 weeks of pregnancy in all the 3 smears and were comparatively more in number in vaginal than the vulval and urinary smears. These cells were larger, thinner and more distinct in the urinary sediment smears.

The values of K.P.I., M.V., C.C.I. and F.C.I. were subjected to statistical evaluation to find out their mean values, standard deviation and standard error by the following formulae.

$$X = \frac{\sum EX}{n} \quad \text{for the mean value}$$

$$S.D. = \sqrt{\frac{\sum Ed^2}{n}} \quad \text{for the standard deviation}$$

$$S.E. = \frac{S.D.}{\sqrt{n}} \quad \text{for the standard error}$$

It is apparent from graph 1 and

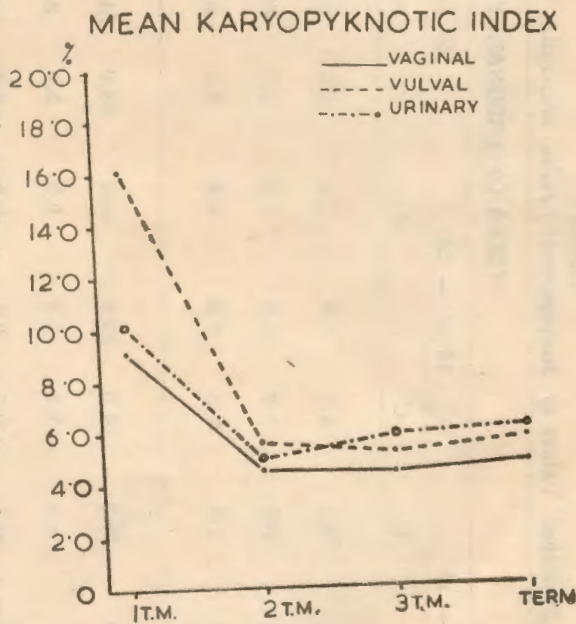


Fig. 1 Comparative vaginal, vulval and urinary Mean Karyopyknotic Index curve in normal pregnancy.

Table I that as compared to vaginal and urinary smears nymphocutogram shows higher values of K.P.I. during the first trimester. Later there is a sharp fall at the end of the first trimester and these low values remained as such till the end

TABLE I
Comparative Statistical Values of Karyopyknotic; Index, Maturation Value, C.C.I. & F.C.I.

Indices	Values	WEEKS OF PREGNANCY											
		0 — — 12			13 — — 26			27 — — 36			37 — — 40		
		C	N	U	C	N	U	C	N	U	C	N	U
K.P.I.	M	9.2	16.2	10.1	4.5	5.6	5.0	4.5	5.2	6.0	4.8	5.7	6.3
	SD	6.6	9.8	5.3	3.9	3.8	2.8	4.8	4.9	3.2	4.5	5.0	2.9
	SE	1.5	2.0	1.4	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.9	0.6
M.V.	M	56.6	56.8	56.8	54.3	55.6	54.5	53.9	54.6	54.5	54.6	54.6	57.6
	SD	3.8	3.0	3.0	3.5	3.5	2.3	2.9	2.8	2.5	3.9	5.5	3.7
	SE	0.8	0.6	0.7	0.5	0.5	0.5	0.3	0.3	0.5	0.7	1.0	0.8
C.C.I.	M	65.8	65.3	36.5	66.1	65.9	45.7	75.0	73.0	53.0	73.5	71.5	45.2
	SD	14.0	12.3	13.3	9.0	7.7	8.2	9.0	8.5	11.2	6.3	8.9	8.7
	SE	33.3	2.8	3.4	1.7	1.3	2.0	1.2	1.1	2.4	1.6	2.1	2.1
F.C.I.	M	78.5	77.7	75.1	77.2	76.1	74.1	85.4	82.2	79.8	83.1	80.8	80.6
	SD	11.3	11.4	15.9	16.2	17.3	18.9	10.5	8.7	8.7	10.5	20.4	9.2
	SE	2.6	2.6	4.1	3.1	3.0	4.7	1.4	1.1	1.7	2.7	5.5	2.6

C—Vaginal—Colpocytogram, N—Vulval-Nymphocytogram; U—Urinary-Urocytogram.

of the third trimester with a slight rise again in all the three smears in the pre-term period. The graph 2 and Table I

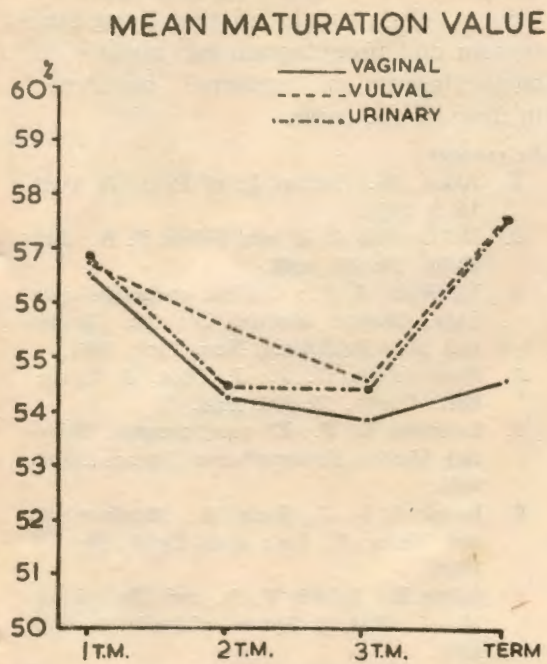


Fig. 2
Comparative vaginal, vulval and urinary Maturation value curve in normal pregnancy.

show that mean maturation value in the vaginal smears during the first trimester fluctuated around 58, while it dipped to 53 and 54 respectively in the second and the third trimesters. The vulval and urinary smears also show similar variations with a slight rise in the preterm period. Thus, there is almost parallel fluctuation in the 3 smears at all the phases of pregnancy. Mean crowded cell index, shown in graph 3 and Table I indicate that as compared to vaginal and vulval the crowding is low in the urinary smears. The folded cell index as shown in graph 4 and Table I show almost similar changes in the mean values of all the 3 smears.

MEAN CROWDED CELL INDEX

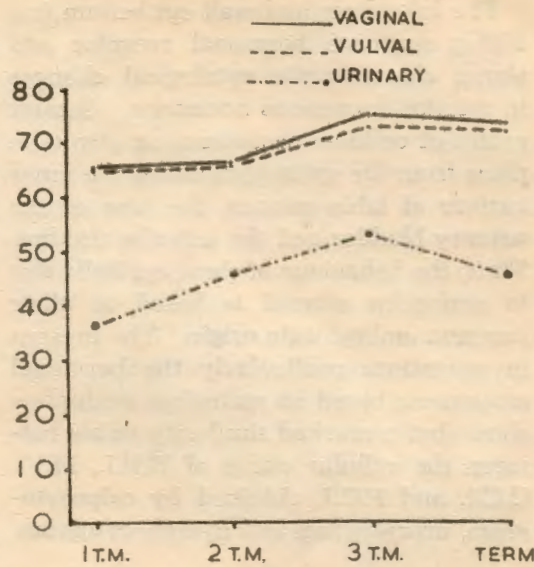


Fig. 3
Comparative vaginal, vulval and urinary Crowded cell index curve in normal pregnancy.

MEAN FOLDED CELL INDEX

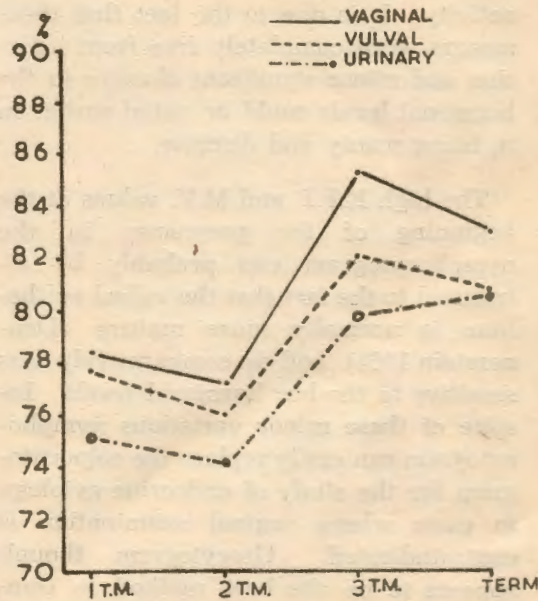


Fig. 4
Comparative vaginal, vulval and urinary Mean folded cell index curve in normal pregnancy.

Discussion

The lateral vaginal wall epithelium is a highly sensitive hormonal receptor and shows characteristic cytological changes in relation to various hormones. Similar cycles of cellular desquamation also take place from the epithelium lining the inner surface of labia minora, the base of the urinary bladder and the anterior urethra. Thus, the behaviour of these epithelia due to endocrine stimuli is based on their common embryologic origin. The present investigations particularly the hormonal assessment based on statistical evaluation show that a marked similarity exists between the cellular curve of K.P.I., M.V., C.C.I. and F.C.I. obtained by colpocytogram, urocytogram and nymphocytogram.

In spite of the parallel shifts in the hormonal levels as observed by the 3 smear techniques, the urinary sediment smear appears to be the more accurate method of determining the hormonal activity. It is due to the fact that these smears were completely free from infection and minor significant changes in the hormonal levels could be noted earlier in it, being scanty and discrete.

The high K.P.I. and M.V. values at the beginning of the pregnancy in the nymphocytogram can probably be attributed to the fact that the vulval epithelium is normally more mature (Dennerstein 1968) and is comparatively less sensitive to the low hormonal levels. In spite of these minor variations nymphocytogram can easily replace the colpocytogram for the study of endocrine cytology in cases where vaginal examination is contraindicated. Urocytogram though appears to be the best method as compared to nymphocytogram, is a tedious and time consuming procedure.

Summary

A comparative statistical study of colpocytogram, urocytogram and nymphocytogram was done in 130 pregnant women. It is concluded that nymphocytogram and urocytogram can replace the colpocytogram in hormonal assessment in most of the cases.

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See Figs. on Art Paper Paper III-IV