

## Ultrasonic Assessment of Ovarian Morphology during Lactation & Effect of These Changes on Fertility Control

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### Abstract

**O**bjective: The aim of this study was to show the effects of lactation on ovarian morphology by ultrasound examination and to express these effects by terms of fertility control .

**Material and Methods:** This study was carried in Al-Zahra'a Teaching Hospital of Maternity & Pediatrics in Al-Najaf City, from March 2007 to September 2007. A total 100 women were studied, divided into two groups, 50 lactating women and 50 non-lactating women and, a comparison was done between ultrasound findings of the ovaries of the two groups; those patients were selected from patients attending out patients clinic of Obstetrics & Gynecology unite. History was taken about age , parity , mode of delivery , no. of breast feeding per day , whether the patient use supplementary food or not , no. of feeding at night , on wishes or demands , if women resume menstruation or not and duration after birth .Ultrasound examination of ovaries was done to all cases and mean ovarian volume , mean follicular number and size was taken and any morphological finding in terms of texture or stromal size

**Results:** We found that there is significant effect of lactation on ovarian volume and morphology and increase number of follicles , with peripheral distribution without detection of mature follicle by studying the size of follicle with increase in ovarian stroma (stromal hyperplasia ).Our study show also that there is strong relationship between suckling episodes , feeding at night , supplementary food during breast feeding , resumption of menses and age of infant with these effects . So we found that increasing of suckling episodes (> 8 times of feeding per day ) and feeding at night twice or more , exclusive breastfeeding without giving even water to the baby , with no resumption of menses and infant less than 6 months of age ; all these gives typical effects on ovarian morphology and make the women sub-fertile by (76 % ) .

**Conclusions:** We conclude that lactation can be considered as fertility control method as long as they may mimic polycystic ovarian syndrome by morphological changes of the ovaries which are temporary as far as these above criteria met by the lactating mother.

### Introduction

Ovaries are considered as important reproductive organs and are affected by and / or affect a lot of physiological condition such as puberty, cyclical changes during menstrual cycle, pregnancy and lactation; One of the important conditions that affect the ovaries directly or indirectly and may be considered as a normal physiological changes in response to hormonal influences; is lactation (1)

.Apparently normal menstrual flow can occur without ovulation preceding it. In some women, follicular development may start but not be completed; nevertheless, estrogens will form and will stimulate the uterine lining and an ovulatory bleeding triggered by a sudden drop in the estrogen levels. It may occur on a regular basis, but more commonly happens with irregular frequency. Anovulatory flow commonly occurs prior to menopause (pre menopause) or in women with polycystic ovarian syndrome <sup>(2)</sup> . It is clear that a

substantial number of mothers who are breast feeding experience a period of infertility and amenorrhea . It is also clear that many women , in particular in western societies resume menstrual cyclicality while still breast feeding .<sup>(3)</sup> Breast feeding is associated with high plasma concentration of prolactin levels , at least at the onset of lactation the levels are correlating to some extent with the number of suckling episodes<sup>(4)</sup>. The prolactin response to suckling declines with time in the puerperium , but if suckling frequency is maintained at a high level basal levels may will remain above normal for 18 months or more<sup>(5)</sup> Breast feeding significantly reduces fertility by suppressing ovarian activity with a variable period of amenorrhea . suckling causes a decrease in the pulsatile secretion of LH from the pituitary<sup>(6)</sup>. Because the pituitary remains normally responsive to GnRH , it is presumed that the release of GnRH is inhibited during breast feeding<sup>(7)</sup>. In full lactation , LH pulses are absent in the beginning and during this time no ovarian follicles develops<sup>(8)</sup>. As suckling declines, an erratic pattern of pulsetile GnRH/LH resumes and can lead to an unpredictable return of fertility in some women. This decreases the degree of reliability of lactational amenorrhea as a method of contraception in a small minority of women<sup>(9)</sup>. However , it has now been confirmed in multinational studies that there is up to 98% protection against pregnancy in the first 6 months of lactation in women who are fully or near-fully breast-feeding and who remain amenorrheic<sup>(10)</sup> .Even though the estradiol concentration remains low during lactational amenorrhea , there is evidence of small follicles developing in the ovaries<sup>(11)</sup> that secrete small amounts of estradiol<sup>(12)</sup>. This small amount of estradiol secreted by the small follicles suppress gonadotrophin secretion during lactation. If LH secretion resumes, this may stimulate limited ovarian estradiol secretion from the small follicles presents ,

but , because of the enhanced sensitivity to negative feedback , this low level of estradiol will switch off further GnRH/LH , stopping of further development of the follicles. In this way , prolonged periods of ovarian suppression can be maintained during breast-feeding<sup>(13)</sup>.

#### **Ultrasound Imaging of the ovaries**

In the follicular phase multiple small follicle are seen in the ovaries after menstruation ends in the proliferative phase of the cycle , normally one follicle grows to a size between 1.5cm and 2.7cm , often alternating sides each menstrual cycle Follicles are not seen in menopausal women but often seen in young girls before puberty . A dominant follicle normally bursts and disappears at ovulation . It is replaced by corpus luteum<sup>(14)</sup>. In Luteal phase typically , a corpus luteum has a thick , slightly echogenic, vascular rim ( the rim of fire on color Doppler ) and an echopenic center. The central echopenic are may be large if there is much bleeding at the time of ovulation . the corpus luteum will usually disappear within a week or so<sup>(15)</sup>.

#### **U / S changes of ovaries during lactation**

: Rgarding ultrasound ovarian morphology , ovaries shows a polycystic ovary ( PCO ) pattern with the distribution of follicles limited to the ovarian periphery and increased ovarian stroma<sup>(16)</sup>. But ovarian volume is higher in the PCO compared with normal group at the 4<sup>th</sup> and 8<sup>th</sup> week postpartum and after weaning<sup>(17, 18)</sup>. A PCO pattern which may be clearly distinguished ultrasonographically from the multi-follicular pattern that accompanies an ovulation associated with decreased GnRH secretion<sup>(19, 20)</sup>. The presence of enlarged ovaries with stromal hyperplasia after delivery could indicate that these ovaries are persistently stimulated during pregnancy, or that the low gonadotrophin and insulin concentrations observed during lactational amenorrhea are able to maintain the function of intragonadal factors with mitogenic activity<sup>(21, 22, 23)</sup>.

**Relationship between lactational amenorrhea and contraception** :Data published in the early 1970s showed that women who breastfed were less likely to ovulate early postpartum , and that if breastfeeding were more intensive , they were less likely than partial or non-breastfeeding to experience a normal ovulation before the first menstrual-like bleed <sup>(24, 25)</sup>. To use lactational amenorrhea correctly , it is important that the patient understand each of the three criteria; Resumption of menses or not , Exclusive breastfeeding or not , and duration after birth menses return <sup>(26)</sup> . This method of family planning is now used in more than 30 countries and has been included in the family planning and maternal and child health policy in several countries. It has been widely accepted as a natural family planning method that demands no abstinence. It is used as an introductory method for the postpartum period, or for the woman who hesitates to use a commodity – based method . It has the added benefit of encouraging optimal breastfeeding behavior, providing synergistic support for primary health of the mother and child <sup>(27)</sup> .

## Material and Methods

This study was carried out at AL-Zahraa Teaching Hospital Of Maternity and Pediatrics in AL-Najaf City , from March 2007 to September 2007 , include 50 lactating women with history of normal term pregnancies were selected for the study from patients attending outpatient clinic of Obstetric and Gynecology unite in AL-Zahraa Teaching Hospital , They were at reproductive age period and their ages ranges between ( 19 – 41 ) years old . Other 50 women who were not lactating at time of study selected to be a control group their ages ranges between (19 – 43) years old Note: women with previous history of polycystic ovarian syndrome were excluded from this study.

For all cases questionnaire according to the following forma: Parity, abortion , mode and date of delivery in the last pregnancy , lactational amenorrhea and it's duration . Breast feeding only 100 % or any additional food or water was given, number of breast feeding ; feeding at night or feeding on wishes (demands ) . The use of other birth control methods and type , retain of menstruation and features of menstruation (regularity , amount , pain , duration and frequency) and the day of menstruation .Clinical examination was done to the patients including pelvic examination Ovarian morphology was assessed by ultrasound examination of the ovaries for all patients included in this study . Scans were made by using ( 3.5 MHz ) abdominal probe ( LOGIQ  $\alpha$  200 , GE Medical system , Korea ) . The mean ovarian volume was considered to be representative of both ovaries in each women , texture of ovaries were examined to show if there is any stromal hyperplasia ( which means : increase in the amount of stroma which is important criteria for diagnosis of PCOS by ultrasound and the other criteria is the presence of either multiple cysts 10 or more with diameter of 2-8 mm distributed evenly around the ovarian periphery ; or less commonly multiple small cysts 2-4 mm in diameter distributed throughout abundant stroma . The combination of multiple follicles and an increased amount of stroma contribute to the overall increase in the ovarian size , on the otherhand , ovarian volume may be within the normal range ) and presence of follicles with their number and size and any signs of polycystic disease of ovaries was looked for ; and if there any free fluid in pouch of Douglas , endometrial thickness were taken to all cases included . Comparison of these data done between lactating and non lactating women and studying the effect of lactation on ovarian morphology by comparison of ovarian morphology of lactating mothers with non-lactating mothers who were considered as

a control group .Statistical study Chi-square and independent t-test has been applied in statistical analysis at level of significance  $\leq 0.05$  .

**Results**

During the period of this study (100) patients were taken , 50 patients were lactating regarded as a study group and other ( 50 patients ) were not lactating

regarded as a control group .All cases full history and examination has been done for them . Abdominal ultrasound were done to all patients included in this study for detection of the effect of lactation on ovaries and endometrium . The data obtained was analyzed using chi-square and independent t-test and applied in statistical analysis at level of significance  $\leq 0.05$  .

Table 1 : demonstrates a comparison of mean ovarian volume ( cm<sup>3</sup> ) and mean of follicular no. in the ovaries and mean follicular size ( cm ) between lactating and non lactating women. Which is statistically significant (P-value < 0.05).

Variables	No. of cases studied	Mean ovarian volume (cm <sup>3</sup> )	Mean follicular no.	Mean follicular size ( cm )
Lactating women	50	8.52	6.98	0.81
Non-lactating women	50	4.07	2.08	1.05

Table 2: demonstrates a comparison of polycystic texture and stromal hyperplasia between lactating and non lactating women. P-value < 0.05

Variables	No. of cases studied	Stromal hyperplasia or polycystic texture	
		Not present	present
Lactating women	50	12 ( 24 % )	38 ( 76 % )
Non – lactating women	50	50 ( 100 % )	0 ( 0 % )
Total	100	62 ( 62 % )	38 ( 38 % )

Table &Fig 3:demonstrates a comparison of endometrial thickness ( cm ) between lactating and non lactating women . Statistically not significant (P-value > 0.05).

Variables	No. of cases	Mean of endometrian thickness ( cm )
Lactating women	50	0.55
Non – lactating women	50	0.57

Table 4: Demonstrate the relation between age and ovarian changes in lactating women

Variables	Age		p-value
	18 – 35 years	More than 35 years	
No. of cases	41 ( 82 % )	9 ( 18 % )	
Mean ovarian volume ( cm <sup>3</sup> )	8.71	8.26	> 0.05
Mean follicular no.	7.44	7.33	> 0.05
Mean follicular size ( cm )	0.85	0.76	> 0.05
Polycystic texture & stromal hyperplasia	- ve	11 ( 22 % )	< 0.05
	+ ve	30 ( 60 % )	
		8 ( 16 % )	

Table &Fig 5:demonstrate the relation between duration after birth and ovarian changes in lactating women

variables	Duration after birth			p-value
	0-6 months	7-12 months	> 13 month	
No. of cases	30 ( 60 % )	12 ( 24 % )	8 ( 16 % )	
Mean ovarian volume (cm <sup>3</sup> )	9.22	8.27	7.34	< 0.05
Mean follicular no.	8.28	6.27	5.12	< 0.05
Mean follicular size(cm )	0.61	0.88	0.98	< 0.05
Polycystic texture & strom. Hyp	- ve	4 ( 8 % )	3 ( 6 % )	< 0.05
	+ ve	26 ( 52 % )	9 ( 18 % )	

Table 6:demonstrates the relation between resumption of menses and ovarian changes in lactating women .

variables	Resumption of menses		p-value	
	Resumed menses	Not resumed		
No. of cases	14 ( 28 % )	36 ( 72 % )		
Mean ovarian volume ( cm <sup>3</sup> )	7.23	9.02	< 0.05	
Mean follicular no.	4.64	8.35	< 0.05	
Mean follicular size ( cm )	0.96	0.76	< 0.05	
Polycystic texture & strom. hyper.	- ve	8 ( 16 % )	4 ( 8 % )	< 0.05
	+ ve	6 ( 12% )	32 ( 64 % )	

There is significant increment in the mean ovarian volume , mean follicular no. and polycystic texture and stromal hyperplasia in while there is significant decline in the mean follicular size in women not resumed menses compared to those who resumed mensis.

Table 7:Demonstrate the relation between added foods while lactating and ovarian changes which represent anovulatory cycle in lactating women .

Variables	No added food	Have added food	p-value	
No. of cases	31 ( 62 % )	19 ( 38 % )		
Mean ovaria volume ( cm <sup>3</sup> )	9.036	7.2	< 0.05	
Mean follicular no.	7.7	4.2	< 0.05	
Mean follicular size ( cm )	0.68	0.86	< 0.05	
Polycystic texture & stromal hyperplasia	- ve	2 ( 4 % )	10 ( 20 % )	< 0.05
	+ ve	29 ( 58 % )	9 ( 18 % )	

In this table there is significant increment in the mean ovarian volume, mean follicular no. mean follicular size, and polycystic texture and stromal hyperolasia and significant decrease in the mean follicular size in those women having added no food compared to those having added food.

**Table 8:**Demonstrates the relation between the number of breastfeeding per day and ovarian changes in lactating women .

Variables	Less than 8 times/day	More than 8 times/day	p-value
No. of cases	14 ( 28 % )	36 ( 72 % )	
Mean ovar. Volume ( cm <sup>3</sup> )	7.33	8.99	< 0.05
Mean follicular no.	4.75	8.12	< 0.05
Mean follicular size ( cm )	0.91	0.97	< 0.05
Polycystic texture & strom. Hyperplasia	-ve	9 ( 18 % )	< 0.05
	+ve	5 ( 10 % )	
		33 ( 66 % )	

In this table there is significant increment in the mean ovarian volume, mean follicular no. mean follicular size, and polycystic texture and stromal hyperolasia in those women having a no. of breast feeding more than 8 / day compared to those group having breast feeding less than 8 / day.

**Table 9:**Demonstrates the relation between number of feeding at night and ovarian changes in lactating women .

Variables	No. of feeding at night					p-value
	zero	1	2	3	4	
No. of cases	2(4%)	4(8%)	15(30%)	16(32%)	13(26%)	
Mean ovarian volume( cm <sup>3</sup> )	3.1	2.91	9.05	9.22	9.60	< 0.05
Mean follicular no.	1.0	5.7	5.6	8.5	8.46	<0.05
Mean follicular size (cm )	0.65	0.65	0.85	0.82	0.84	> 0.05
Polycystic texture & strom. Hyperplasia	-ve	2(4%)	4(8%)	5(10%)	0(0%)	< 0.05
	+ve	0(0%)	0(0%)	10(20%)	16(32%)	
					12(24%)	

There is significant increment in the mean ovarian volume , mean follicular no. and polycystic texture and stromal hyperplasia

with the increment in the no. of breast feeding at night, but there is no significant changes in the mean follicular size.

## Discussion

Lactation is a gift from God to the mother and the baby ; and from physiological point of view it has a lot of advantages to both of them, and also from this point of view it must be translated into changes and effects that are expressed by morphological and hormonal terms on the reproductive organs , and the most important of them are the ovaries .This study involve studying the effect of lactation on the morphology of the ovary

by ultrasound examination of the ovaries of lactating mother in order to show these effects by means of size and texture which gives a lot of expression on the fertility control .Our study shows significant effect of lactation on the ovarian morphology ; where the ovarian volume was significantly affected (increased) in lactating women , and also mean follicular number (increased) and mean follicular size (decreased) with p-value < 0.05, these

changes goes with the features of anovulatory cycle in addition to the polycystic texture and stromal hyperplasia of lactating mothers affects the ovary by (76 %) according to our study ; this interesting findings show that these changes may give the ovaries a picture similar to PCOS with distribution of follicles limited to ovarian periphery , so this considered as a state of PCOS morphology ; this was consistent with T.Sir-Peterman , L.Devoto , M. Maliqueo , P.Peirano , S.E.Recabarren and L.Wildt who were found that the ultrasound ovarian morphology of lactating women showed a PCOS pattern with the distribution of follicles limited to the ovarian periphery , and increased ovarian stroma in their study named " Resumption of ovarian function during lactational amenorrhoea in breastfeeding women with polycystic ovarian syndrome (28) so we may consider that lactation affects fertility by (76 %) by our study and lactating mothers are less likely to ovulate Because we couldn't detect a mature follicle during our study (only one lady found to be pregnant accidentally during our study) so we found that the percentage of failure of the lactation as a method of contraception by (2 % ) which was consistent with Kennedy KT, Rivera AS & McNeilly AS who were found in a multinational studies that there is up to 98 % protection against pregnancy in the first 6 months of lactation in women who are fully or near fully breast feeding and who remain amenorrhic in their study named " Consensus statement on the use of breastfeeding as a family planning method contraception" in 1989.(29) . Regarding these effects of lactation in terms of aetiology we found that the duration after birth is important determinant of these effects and these changes found to be clear and accentuated in women who are breast feed their babies of age less than 6 months with p-value < 0.05 and by (52 %) of women who breastfeed babies of less than 6 months i.e duration after birth is less 6 months (52

%) of them show the above changes that considered as a state of fertility control. Regarding these ovarian changes in relation to resumption of menses , we found that (64 %) of women who are lactating and not resumed their menses show changes typically ( p-value < 0.05 ) ; 12% of cases who resumed menses show these changes so according to our study resumption of menses which is indication of resumption of fertility have effect on ovarian changes ; which may be considered as a cause or effect of these changes. Regarding the effect of exclusive breastfeeding (58 %) of cases who have no added food (even water) show these changes typically ( p-value < 0.05) and (18 %) who used added food while breastfeeding show these changes . The above 3 findings of our study are consistent with Labbok M , Perez A ,Valdes V , who were found that in order to control fertility by lactation the women must meet the above three criteria (which were translated by terms of ultrasound findings or morphological effects by our study) in their study named " The lactational amenorrhea method : A new postpartum introducing Family Planning Method with program and policy implicates Advance contraception " in 1994 and Human Reproduction, 2001 (14,30) . Regarding the relation of number of breastfeeding and feeding at night which may indicate effect of suckling episodes , we found that ( 66 % ) of cases who are feeding more than 8 times per day have typical changes and ( 10 % ) of those who are feeding less than 8 times per day have these changes ( p-value < 0.05 ) . Regarding feeding at night which have a significant effect on ovarian changes , and these changes accentuated in women who are feeding many times per night ( i.e twice and more ) . So according to our study ; as far as the women feeding the baby with a lot of times and suckling episodes ; so the ovarian changes will be more and more ; this finding goes with McNeilly As. Who found that if lactating

women feed their babies by many times and a lot of suckling episodes as much as possible so this will suppress gonadotrophin secretion in his study named " suckling and the control of gonadotrophin secretion in 1994 (21,31) and Mary Ann , Inc. 2006. Regarding age

## Conclusions

From this study we conclude that:-

1. There is a significant effect of lactation on the ovarian morphology that may mimic PCOS patterns.
2. This effect of lactation may be expressed by terms of fertility rendering the women subfertile for a period of lactation .
3. The state of fertility control depends on suckling episodes, duration after birth, resumption of menses and whether the women use supplementary food or not.
4. In order to use lactation as a contraception , the woman must feed her infant exclusively on breastfeeding and many times per day; especially at night meeting the demands of the baby and have no menstruation and their babies of less than 6 months of age .

## Recommendation

We recommend a further study including large number of cases, and to include hormonal study e.g; Prolactin, Estrogen, LH, FSH, and Testosterone level.

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distribution we found that these changes were mostly at age group between (18-35) years old ; which is the reproductive period; so this may be the explanation of these results, probably this needs large no. of cases to be study.

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