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THE RELATIONSHIP BETWEEN PROLACTIN LEVEL AND THE DURATION OF LACTATIONAL AMENORRHOEA IN LACTATING SUDANESE WOMEN

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Abstract:

Background*:* This study aimed to assess the relationship between the prolactin (PRL) level and the duration of lactational amenorrhoea in lactating Sudanese women.

Methods: Sudanese women (135) from Omdurman area with different ages (18-41 years) and stages of lactation were included, 61 of them participated by giving venous blood samples and filling a questionnaire, while the others by filling the questionnaire only. Pregnant women, contraceptives users, and hypothyroid patients were excluded. The subjects were divided into lactational amenorrhoeic (Group I), and lactating menstruating subjects (Group II). Then each group was subdivided according to the duration of lactation into: -

Lactating for six months or less.

Lactating for more than six months.

Prolactin level was measured using radioimmunoassay (RIA).

Results*:* In this study the mean prolactin level in-group I (2934.99 mU/L) was significantly higher compared with group II (707.46 mU/L) ($P<0.05$).

For the duration of lactation, PRL level in the first six months was higher (4414 mU/L), (1506.60 mU/L) in group I, and group II respectively, while this level decreased after six months (1538 mU/L), (517.19 mU/L) for the two groups.

Also we found that factors like breast-feeding patterns, utilization of supplementary foods, and the number of parities had a significant effect on the duration of lactational amenorrhoea.

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Conclusions*:* There was a positive relationship between PRL level and the duration of lactational amenorrhoea (r=0.39).

ملخص:

أجريت هذه الدراسة بهدف تحديد العلاقة بين مستوى هرمون اللبن (بروﻻكتين) وإستمرارية فترة انقطاع الطمث أثناء الرضاعة للمرضعات السودانيات. وقد شملت الدراسة 135 إمرأة مرضعة من منطقة أمدرمان في مختلف مراحل الرضاعة ومختلف الأعمار. وقد تم جمع المعلومات عن طريق الاستبيان وعينات الدم من 61 مرضعة , بينما شاركت البقية بالاستبيان فقط. استبعدت من هذه الدراسة النساء الحوامل واللائي يستخدمن موانع الحمل واللائي يعانين من نقص هرمون الغدة الدرقية.

تم تقسيم المرضعات إلى مجموعتين إحداهما تضم اللائي لم يأتيهن الطمث خلال الرضاعة (المجموعة الأولى) والأخرى تضم اللائي أتاهن الطمث أثناء الرضاعة (المجموعة الثانية). ثم قسمت المجموعتين الرئيسيتين إلى مجموعات فرعية على حسب عدد شهور الرضاعة وتشمل:-

- المرضعات لفترة 6 أشهر أو أقل.
- المرضعات لأكثر من 6 أشهر.

تم تحليل عينات الدم لقياس مستوى هرمون البروﻻكتين بواسطة القياس المناعى الإشعاعي. أظهرت نتائج هذه الدراسة أن مستوى هرمون البروﻻكتين في المجموعة الأولي (2934.99 وحدة قياسية/لتر) أعلى من المجموعة الثانية (707.47 وحدة قياسية/لتر) وقد كانت هذه النتائج ذات دلالة إحصائية (P<0 .01).

وكان مستوى هرمون البروﻻكتين في فترة الستة شهور الأولي عاليا في المجموعتين حيث كان في الأولي (4414 وحدة قياسية/لتر) والثانية (1506.60 وحدة قياسية/لتر).

ثم قل مستوى الهرمون بعد الستة أشهر حيث أصبح المتوسط 1538 وحدة قياسية/لتر في المجموعة الأولي 517,19 وحدة قياسية/لتر في المجموعة الثانية.

من خلال نتائج هذه الدراسة وجد أن هناك عوامل أخرى لها تأثير ذو معنى مثل عدد الرضعات أثناء اليوم , استعمال الأغذية الإضافية للرضيع وعدد الولادات . خلصت هذه الدراسة إلى أن هناك علاقة إيجابيه بين مستوى هرمون البروﻻكتين واستمرارية فترة انقطاع الطمث أثناء الرضاعة (r=0.39) .

Introduction:

Breastfeeding delays the resumption of menstruation after childbirth, and lactational amenorrhea—and the associated suppression of ovulation—is still the primary factor responsible for birth spacing in sub-Saharan Africa, where the use of modern contraception is limited by lack of access and by ideologic concerns in traditionally pronatalistic societies. However, preventing short birth intervals is important [(1)]. Breast-feeding is associated with the suppression of ovarian activity and thus with a variable period of amenorrhoea and infertility [(2)]. Women who breast-feed their infants frequently and who delay the introduction of supplementary feedings tend to remain amenorrhoeic for a longer period [(3, 4)]. WHO, [(5)] reported that exclusive breastfeeding decreased significantly the risk of experiencing the first postpartum bleeding at the end of the sixth postpartum month, and 49% of the fully breastfeeding mothers were amenorrhoeic as opposed to 19% of those who had started supplements. They also reported that the

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cumulative pregnancy rate at six months postpartum was 25% for mothers who had their first menses but only 2% for those still amenorrheic. Some degree of protection against pregnancy remained for at least five months after the resumption of menses in fully breastfeeding women as evidenced by their lower cumulative pregnancy rate in comparison with non-nursing controls. A retrospective study in Sudan showed that about 65% of lactating women had amenorrhoea during lactation [6]. The average duration of lactational amenorrhoea was 12 months. In general amenorrhoea was of short duration (3-9) months in the first lactational interval, and of longer duration (more than 10) months in subsequent intervals [6]. Other studies indicated that there was no relationship between PRL level and duration of lactational amenorrhoea [7], and it could be represented only as a marker of suckling during this period [8]. Because most studies done in Sudan concentrated on the level of prolactin in infertile patients and pathologic hyperprolactinemia, this study will assess the relationship between prolactin (PRL) level and the duration of lactational amenorrhoea in lactating Sudanese women considering the factors affecting this relationship.

Methods:

This is a cross-sectional study which included 135 mothers in different stages of lactation. Samples and data were collected after their consent. Gareeb Elgoosi immunization centre and the homes in (Omdurman province-Sudan) was the area of study, in the period from August to December 2003. Mothers were then divided into two groups according to the duration of lactational amenorrhoea. Group I included (77) lactational amenorrhoeic mothers. Blood samples were drawn from 35 subjects, while the rest filled the questionnaire only. According to the duration of lactation group I was subdivided into two subgroups; subgroup A_1 (45): (Mothers lactating for 6 months or less), and subgroup B_2 (32): (mothers lactating for more than 6 months). Group II included (54) lactating menstruating mothers. Blood samples were drawn from 26 subjects, while the rest filled the questionnaire only. This group also subdivided into two subgroups according to the duration of lactation subgroup A_2: (Mothers lactating for 6 months or less than 6 months), and subgroup B_2: (mothers lactating for more than 6 months). A questionnaire was designed to obtain information about amenorrhoea, the factors that affect prolactin level and duration of lactational amenorrhoea. The questions asked in the questionnaire included; breastfeeding patterns, number of night suckling, utilization of supplementary foods, number of parities, and age of mothers. Exclusion criteria included subjects with hypothyroidism, contraceptive users, and pregnant mothers. Blood samples were collected at least one hour after suckling. Serum was separated and stored at -20 C^o, then analyzed later on as one batch. Prolactin was measured by radioimmunoassay kit, according to Department of Isotopes China Institute of Atomic Energy. Values reported as the mean±SD (Standard Deviation). One Way Anova Test was employed to evaluate the data of all parameters. A value of $p<0.05$ was considered statistically significant.

Results:

As shown in table (I) mean basal prolactin concentration was significantly higher ($P<0.01$) in amenorrhoeic mothers than in menstruating mothers. [9]

The difference in prolactin levels was more apparent during the first 6 months of lactation (subgroup A_1, A_2) compared with level after 6 months (subgroup B_1, B_2) see table II.

Suckling frequency was significantly higher ($P<0.01$) in group I compared with group Π, while suckling duration was significantly longer ($P<0.05$) in group Π compared with group I. There was a significant difference between the two groups in suckling frequency, suckling duration, and the number of

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parities. However, there was no significant difference in the age of nursing mothers (Table I). In the subgroups the frequency of suckling was relatively higher in the first six months compared with the later months, the duration of suckling in the first six months was shorter than the later months (Table II).

Table I: Comparison of lactating amenorrhoeic (Group I), and lactating menstruating (Group II) women in prolactin level and other factors.

Factors	Group I Mean ± Std	Group II Mean ± Std	Sig.
Prolactin level mU/L	2934.99±2301.62	707.46±452.8	**
Frequency of suckling/24hrs	10.27±3.7	7.24±2.5	*
Duration of suckling/min	12.09±7.3	14.46±7.1	*
Age of mother/years	28.56±5.78	27.87±6.5	NS
Number of parities	3.56±2.1	2.67±1.8	*

* = P<0.05

** = P<0.01

NS= Not significant

Table II: Comparison of prolactin level, frequency and duration of suckling in all subgroups.

Factors	A1	A2	B1	B2
Prolactin level mU/ L	4414±2507.7	1506±483.23	1538±649.47	517.19±108.99
Frequencyof suckling/hrs	11.44±4.14	9.80±1.66	8.63±2.27	6.26±2.09
Duration of suckling/min	9.33±6.28	9.79±2.89	15.97±7.06	16.95±7.21

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Table (III) showed the frequency and distribution of night suckling, which was higher in group I compared with group Π. The frequency and percentage of utilization of supplementary foods was higher in group Π compared with group I.

Table III: The frequency and percentage of the number of night suckling and utilization of supplementary foods in Group I and Group II.

		Number of night suckling			Utilization of supplementary foods	
		Zero	One	> One	Yes	No
Group I	Percentage	2.6%	9.1%	88.3 %	53.2%	46.8%
	Frequency	2	7	68	41	36
Group II	Percentage	3.7%	13%	83.3 %	81.5%%	18.5%
	Frequency	2	7	45	44	10

In both groups the utilization of supplementary foods had significant effect on the duration of lactational amenorrhoea.

Figure (1) demonstrates the comparison between PRL levels and stage of lactation in group I and Π.

Figure (1): Comparison between PRL level and stage of lactation in lactational amenorrhoeic mothers (Group I) and lactating menstruating mothers (Group II).

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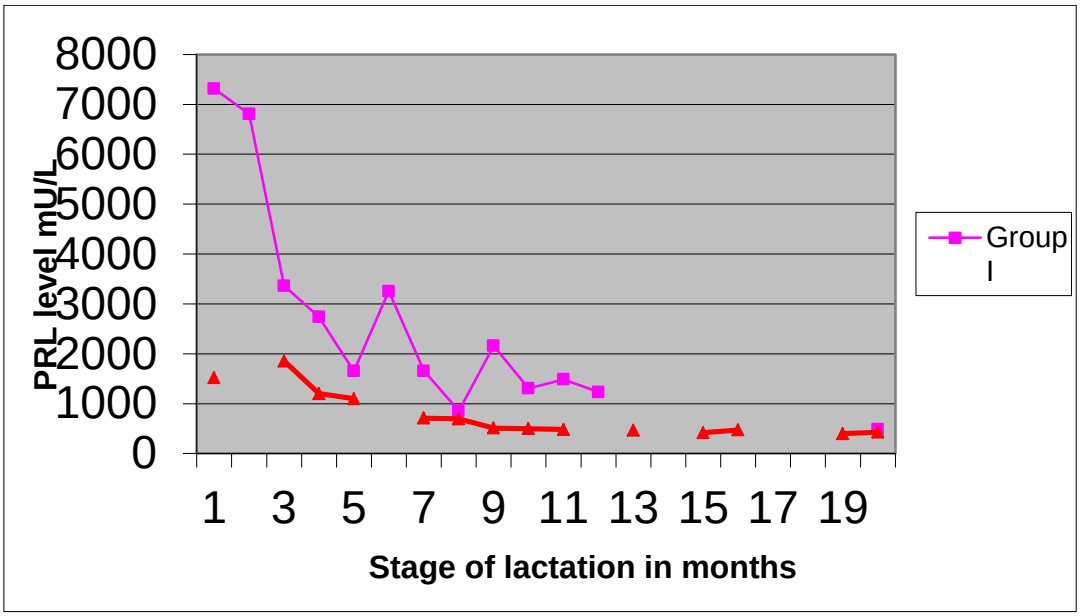

Discussion:

Breastfeeding has long been a means of fertility regulation in traditional communities, but only recently attempts have been made to characterize and quantify this attribute. Breastfeeding encompasses behavioral, geographical, and cultural factors, which account for the differences in the prevalence and practice of breastfeeding in different communities [10]. Cultural beliefs and norms regarding breastfeeding practices are of extreme significance in determining the duration of lactational amenorrhea. Flexible family planning programmes, which encourage the continuation of breastfeeding while promoting the use of appropriate contraceptive methods initiated when they will affect fertility, are needed in developing countries [11].

The present results support the hypothesis that prolactin is involved in the long-lasting amenorrhoea which occurs in regions where breast-feeding is prolonged for up to 2 years after delivery [9].

Another hypothesis indicates that high prolactin levels during lactation are responsible for lactational amenorrhea, because they reduce the pulsatility of GnRH, and this lowers LH level, and antagonizes its action on the ovaries, so ovulation is inhibited, and ovaries are inactive. This result disagrees with Tay *et al* [5] who found no relationships between PRL levels and duration of lactational amenorrhea, but in accordance with others [12,13,14,15]. In this study prolactin shows significant positive correlation with duration of amenorrhoea. This conclusion is consistent with recent observation that in postpartum the incidence of amenorrhoea declined parallel to that of hyperprolactinemia [15]. During the past several years many studies have been made to investigate the return of fertility in relation to breastfeeding patterns. It was found in these studies that both the number of breastfeeding episodes per day and the average duration of suckling per breastfeeding episode contributed significantly to the delay in the return of ovulation. Conversely, the risk of onset of ovulation rose as the mother increased the daily number of supplementary feeds [2,6,7,8,16]. This study revealed that the frequency of suckling was higher in the first six months in both groups, and after six months the frequency was lower. This result was expected because babies in the first months usually depend on breastfeeding completely compared with the later months in which mothers introduce supplementary foods. The high frequency suckling in lactational amenorrhoeic group may elevate the PRL levels, and so delayed the reinitiation of menstruation. Other results suggest that if a breast feeding mother wishes to rely upon the infertility associated with lactational amenorrhoea,

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she must suckle at least five times per day with a total suckling duration of more than 65 min per day (more than 10 minutes per feed). Any reduction below either of these limits may result in return of fertility [17]. A similar association was identified by Kamani [12]. In this study the duration of suckling in-group Π was significantly longer than group I. This result agrees with the evidence that the short duration of suckling in lactational amenorrhoeic mothers lead to high frequency of suckling, and so high PRL levels leading to the delay in the onset of menstruation. In spite of the fact that mothers in different stage of lactation, breast feed their babies at night, this study found no significant difference between lactating menstruating and lactational amenorrhoeic mothers in the number of night suckling.

The early introduction of supplementary foods decreased the frequency of suckling and therefore lowered PRL levels leading to early menstruation in lactating menstruating mothers. In this study the introduction of supplementary foods began earlier in lactating menstruating mothers compared with lactational amenorrhoeic group, and there was statistical significance difference in the introduction of supplementary food and duration of lactational amenorrhoea. This finding is in accordance with [7,12,18], who concluded that supplementary feeding correlated statistically with the decline in mean serum prolactin levels, and the subsequent resumption of menstruation, however another result suggests that introduction of supplementary feeding had little effects on lactational amenorrhoea up to 9 months of breast feeding [5].

In summary it was found that the higher PRL levels the longer the duration of lactational amenorrhoea, and the variation of these factors between mothers may explain the variation in the duration of lactational amenorrhoea.

We recommend that frequent breast feeding for short time, and delayed supplementary feeding may be of benefit in prolonging lactational amenorrhoea.

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