

# To See the Correlation of Menstrual Cycle Factors with Time to Achieve a Pregnancy, in a Cross Sectional Survey of a Tertiary Care Hospital in Karachi

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## ABSTRACT

**Objective:** To see the correlation of menstrual cycle factors with time to achieve a pregnancy, in a cross sectional survey of a tertiary care hospital in Karachi.

**Study Design:** A cohort study and convenience sampling technique was used.

**Place and Duration of Study:** The outpatient department of OBGYN, The Dow University Hospital, from June 2020 till June 2021.

**Methodology:** All the women who were coming to antenatal clinic and were eligible with the inclusion criteria were interviewed in the OPD (outpatient department). The research instrument used for the study was a self-developed questionnaire, which comprised of demographics, reproductive and medical history and life style and behavioral factors in close ended questions on the menstrual cycle patterns.

**Results:** among the participants with age of menarche  $\leq 14$  years old 98.2% reported for regular menstrual cycle, 6.5% reported for less than 25 days of cycle length, 5.3% reported for less than 3-days of bleeding duration, 68.8% were currently pregnant, out of which 53% conceived after trying for conception between 6-9 months. , in samples with menarche age more than 15-years old 90.3% reported for regular menstrual cycle, 33.3% reported for 27-29 days of cycle length, 31.9% reported for less than 3-days of bleeding duration, 72.2% were currently pregnant, 37% conceived after trying for conception from 6-9 months.

**Conclusion:** Therefore from this study we concluded that late menarche ( $>15$  years), prolonged cycles and decrease bleeding days are the associated factors with decrease fecundity in terms of prolonged time to achieve pregnancy in our study population.

**KeyWords:** Menarche, Time to pregnancy, fertility, menstrual cycle.

## INTRODUCTION

Menstrual cycle regularity is an important factor when evaluating a female for subfertility. Menstrual cycle length and its regularity indicates about the normal endocrine functioning in the reproductive age females<sup>1</sup>. And also the age of the first menstrual cycle (MENARCHE) plays an important role in a female's life; as early age of menarche predisposes to longer years of estrogen exposure and risks of breast cancer and late age of menarche cuts the fertile period for a female, and increases the risk of osteoporosis and fracture.

The variability in cycle length comes from the variation in the follicular phase of the cycle, while secretory phase is constant, therefore the shorter cycles means shorter follicular length<sup>2,3</sup>. Another important predictor of regularity and the cycle length is the age. Therefore in perimenopausal age groups the cycles become shorter and irregular.<sup>4,5,6</sup> Independent of the age , short cycles may reflect poor oocyte quality<sup>7-10</sup> or abnormal hormonal milieu.

Menstrual bleeding days and amount also gives an indication of ovulation and the endometrial growth. Shorter and scanty bleeds may signify suboptimal endometrium preparation for the conceptus to implant while longer bleeds may indicate anovulatory cycles.

In this study we are exploring the relation of age of menarche, menstrual cycle length and the bleeding duration in time to become pregnant, amongst the Pakistani women in a tertiary care hospital at Karachi.

## MATERIALS AND METHODS

This study was conducted in the outpatient department of OBGYN, The Dow University Hospital, from June 2020 till June 2021. The period was extended beyond 6 months to fulfill the sample size as due to the covid pandemic the attendance in OPD was short. Convenience sampling technique was used and the eligible females were given a consent form and to decide for participation or not. The inclusion criteria were: age between 18-40 years, and the patients with parity 0 or 1 (ie. Primigravidas or second pregnancy) were included. The females having irregular cycles or having any assistance in fertility were excluded. Sample size of 427 was completed through a questionnaire based interview.

The research instrument used for the study was a self-developed questionnaire, which comprised of demographics, reproductive and medical history and life style and behavioral factors in close ended questions on the menstrual cycle patterns.

The questionnaire was filled by the author and co-authors. The study protocol was approved by the ethical committee (IRB) of the Dow University of Health Sciences.

**Study Population:** All the women who were coming to antenatal clinic and were eligible with the inclusion criteria were interviewed in the OPD (outpatient department) on the following questions.

First part included the bio data of the patient, following that was the part of questionnaire about their life styles, and then about the menstrual Characters.

**Biodata:** This section included the general information, their height (meters) ; and weight (Kilograms).

**Life Style Patterns:** This section included following categories:

**Regularity of home meals and exercise, tv related viewing and eating habits and irregular exercise, eating out of home and irregular exercise, eating out side and no exercise:** Then they were interviewed for past surgical and medical history, and their baseline complete blood count was noted.

**AOM (Age Of Menarche):** First question which was asked in the interview was “**How old were you when you had your first menstruation?**” Women not remembering it were marked as missing information.

The information was divided as following age groups: <12 yrs, 13-14 yrs, 15 yrs, 16 yrs, 17 yrs, >18 yrs.

**Cycle Rhythm:** Next question that was asked was about the rhythm of their cycle, whether regular or irregular. And then they were asked “. **How many days is it from the first day of one menstrual cycle to the first day of your next menstrual cycle?**”

This information was divided into following patterns: < 25 days, 25-26 days, 27-29 days, 30-31 days, >31 days.

**Bleeding Days:** Next in their interview they were asked about the bleeding in their menstruation: “ **How many days does your period usually flow?(bleeding , not spotting )**”

Their responses were categorized into following: <4, 4-5, 6, 7, >7.

**Time To Pregnancy: (TTP):** Next in their interview were asked whether they are pregnant, and “**Since how many days were you trying to conceive?**”

Their responses were categorized into following: < 3 months, 3-6 months, 7-9 months and 10-12 months.

**Statistical Analysis:** Data were stored and analyzed using IBM-SPSS version 23.0. Counts with percentages were reported for education, occupation, ethnic group, BMI levels, age of menarche, and variables on life style, obstetric history, menstrual and other parameters. Mean with standard deviation were reported for age, BMI, Hemoglobin, TLC, and platelets. Pearson Chi Square test was used to check the association of qualitative parameters with menarche age groups samples and one way ANOVA was used to compare the mean age, BMI, Hemoglobin, TLC and platelets across menarche age group samples, Tukey’s test of multiple comparison was used in post hoc analysis. Binary logistic regression was also use to estimate the odds ratio and 95% confidence interval for the studied risk factors for menarche age ≤14-years old among samples. All p-values less than 0.05 were considered statistically significant. Pie diagram and Bar charts were also used to give the graphical presentation of data.

## RESULTS

Table-1 reports the baseline characteristics of studied samples, in the present study there were 427 samples among them 30.2% were intermediate education, mean age of samples was 25.5 (SD=±5.4) years, 72.8%

participants were housewife, 22.2% were Pathan, 23% were sindhi and 19% were from Muhajir ethnic group, mean BMI of samples was 28.4(SD=± 3.8) kg/m<sup>2</sup> and 85.9% found with BMI levels more than or equal to 25 kg/m<sup>2</sup>.

Pie diagram -1 is showing the percentages of menarche age group, 39.8% were reported less than or equal to 14 years, 33.7% were 15 years and 16.9% were reported more than 15 years whereas 9.6% samples did not remember their age of menarche.

Table-2 reports the association of menarche age group with respect to life style and obstetric history of samples, results showed sample with menarche age group ≤14 years 21.2% were doing exercise regularly, 27.6% were restricted to regular home meals thrice a day, 53.5% were married ≤3 years ago, and 21.2% were reported for threaten miscarriage, among samples with menarche age of 15-years old none of them were doing exercise regularly, 46.5% were restricted to regular home meals thrice a day, 51.4% were married ≤3 years ago, and 4.2% were reported for threaten miscarriage, in samples with menarche age more than 15-years old 12.5% were doing exercise regularly, 47.2% were restricted to regular home meals thrice a day, 68% were married ≤3 years ago, and 4.2% were reported for threaten miscarriage , whereas among samples who did not remember their menarche age none of them were doing exercise regularly, 58.5% were restricted to regular home meals thrice a day, 78.1% were married ≤3 years ago, and 9.8% were reported for threaten miscarriage. Pearson Chi Square test gives a significant association of exercise, meals, married duration and obstetric history with menarche age group of samples (p<0.01).

Table-3 reports that among samples with age of menarche ≤14 years old 98.2% reported for regular menstrual cycle, 6.5% reported for less than 25 days of cycle length, 5.3% reported for less than 3-days of bleeding duration, 68.8% were currently pregnant, out of which 53% conceived after trying for conception between 6-9 months. In samples with menarche age of 15-years old 95.8% reported for regular menstrual cycle, 4.9% reported for less than 25 days of cycle length, 22.9% reported for less than 3-days of bleeding duration, 79.2% were currently pregnant, 36% conceived after trying for conception from 6-9 months, in samples with menarche age more than 15-years old 90.3% reported for regular menstrual cycle, 33.3% reported for 27-29 days of cycle length, 31.9% reported for less than 3-days of bleeding duration, 72.2% were currently pregnant, 37% conceived after trying for conception from 6-9 months, whereas among samples who did not remember their menarche age 97.6% reported for regular menstrual cycle, 12.2% reported for 25-26 days of cycle length, 9.8% reported for less than 3-days of bleeding duration, all were pregnant, 68% conceived after trying for conception from 6-9 months, all these variables gives significant association with menarche age group using Pearson Chi Square test (p<0.05).

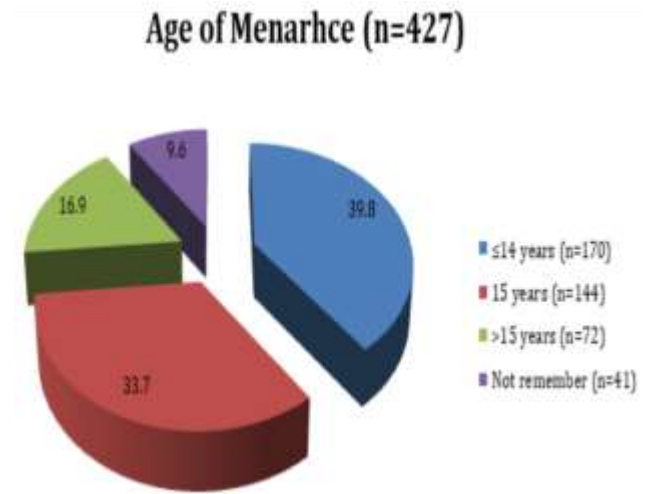
Table-4 reports the mean and standard deviation of age, BMI, Hemoglobin, TLC and Platelets of samples with respect to age of menarche, One way ANOVA showed a significant mean difference for these variable across groups (P<0.01), in post hoc analysis using Tukey’s test

there was significant mean differences observed for age between menarche age ≤14 vs. not remember samples (p=0.024), significant mean difference for BMI between menarche age >15 vs. ≤14-years and 15-years (p<0.01), significant mean difference in Hemoglobin for menarche age ≤14-years vs. >15 years (p<0.01), significant mean difference for TLC between menarche age ≤14-years vs. 15-years old (p<0.01) and significant mean difference for Platelets for menarche age 15-years vs. nor remember samples (P<0.05).

Table 1: Baseline Characteristics of Studied Samples (n=427)

Characteristics		n	%
Education	Up to primary	66	15.5
	Matriculate	92	21.5
	Intermediate	129	30.2
	Postgraduate	64	15.0
	Illiterate	76	17.8
Age (years)	Mean ±SD	25.5±5.4	
Occupation	Teacher	25	5.9
	Doctor/nurse	25	5.9
	Engineer	2	0.5
	Personal business	19	4.4
	Housewife	311	72.8
	Others	45	10.5
Ethnic group	Muhajir	83	19.4
	Sindhi	98	23.0
	Punjabi	55	12.9
	Pathan	95	22.2
	Balochi	72	16.9
	Sarayeki	24	5.6
BMI Levels	Mean ±SD	28.4±3.8	
	18.5 - 22.9	22	5.2
	23 - 24.9	38	8.9
	≥25	367	85.9

with eating outside excessively, threatening miscarriage, GDM, higher hemoglobin, length of cycles with 25 – 26 days, bleeding for more than 3-days and first pregnancy after 1-years ago were found positively associated with menarche age ≤14-years, in multivariate these odds were adjusted with age and BMI, samples who eating outside excessively, married for more than 3-years, threaten miscarriage, GDM, bleeding 5- 6 days were found more likely to be found with menarche age ≤14-years old , in Univariate higher platelets and in multivariate pregnancy status give negative association with menarche age less or equal to 14-years. P-values for all these odds ratios were found statistically significant with level of significance <0.05.



Pie Diagram 1:

Table 5- reports the risk for the menarche age less than or equal to 14 years, in Univariate analysis samples

Table 2: Association of Age of Menarche with life style and obstetric history of samples

Parameters		Age of menarche								p-value
		≤14 years (n=170)		15 years (n=144)		>15 years (n=72)		Not remember (n=41)		
		n	%	n	%	n	%	n	%	
Exercise	Regularly	36	21.2	0	0.0	9	12.5	0	0.0	<0.01*
	Irregularly	56	32.9	24	16.7	6	8.3	5	12.2	
	Not at all	78	45.9	120	83.3	57	79.2	36	87.8	
Meals	restricted to regular home meals thrice a day	47	27.6	67	46.5	34	47.2	24	58.5	<0.01*
	eating out once a week with home meals	70	41.2	47	32.6	20	27.8	12	29.3	
	eating out twice a week with home meals	35	20.6	28	19.4	18	25.0	5	12.2	
	eating outside excessively	18	10.6	2	1.4	-	-	-	-	
Married for	≤3 years	91	53.5	74	51.4	49	68	32	78.1	<0.01*
	>3 years	79	46.5	70	48.6	23	32	9	22	
Present obstetric history	Threaten Miscarriage	36	21.2	6	4.2	3	4.2	4	9.8	<0.01*
	PIH	0	0.0	12	8.3	7	9.7	1	2.4	
	GDM	28	16.5	5	3.5	8	11.1	4	9.8	
	preterm labor	9	5.3	4	2.8	12	16.7	-	-	
	IUGR	-	-	1	0.7	-	-	-	-	
	IUD	-	-	3	2.1	-	-	1	2.4	
Unremarkable	97	57.1	113	78.5	42	58.3	31	75.6		

\*p<0.05 was considered statistically significant using Pearson Chi Square test

Table 3: Association of Age of Menarche with Menstrual and other parameters

Parameters		Age of menarche								p-value
		≤14 years (n=170)		15 years (n=144)		>15 years (n=72)		Not remember (n=41)		
		n	%	n	%	n	%	n	%	
Menstrual cycle	Regular	167	98.2	138	95.8	65	90.3	40	97.6	0.03*
	Irregular	3	1.8	6	4.2	7	9.7	1	2.4	
Cycle length	<25 days	11	6.5	7	4.9	-	-	-	-	<0.01*
	25-26 days	40	23.5	7	4.9	-	-	5	12.2	
	27-29 days	67	39.4	79	54.9	24	33.3	19	46.3	
	30-31 days	42	24.7	22	15.3	18	25.0	12	29.3	
	31-35 days	10	5.9	29	20.1	30	41.7	5	12.2	
Bleeding duration	<3 days	9	5.3	33	22.9	23	31.9	4	9.8	<0.01*
	3-4 days	67	39.4	66	45.8	30	41.7	18	43.9	
	5-6 days	79	46.5	41	28.5	18	25.0	19	46.3	
	6-7 days	15	8.8	4	2.8	1	1.4	-	-	
Pregnant	Yes	117	68.8	114	79.2	52	72.2	41	100.0	<0.01*
	No	53	31.2	30	20.8	20	27.8	-	-	
Trying for conception	<3 months	8	4.7	1	0.7	-	-	-	-	<0.01*
	3-6 months	22	12.9	27	18.8	9	12.5	5	12.2	
	7-9 months	69	40.6	25	17.4	18	25.0	23	56.1	
	10-12 months	48	28.2	64	44.4	19	26.4	13	31.7	
	1-2 years	4	2.4	19	13.2	26	36.1	-	-	
	2-3 years	6	3.5	4	2.8	-	-	-	-	
	Not trying to conceive	13	7.6	4	2.8	-	-	-	-	
First pregnancy	Current pregnancy	23	13.5	45	31.3	11	15.3	26	63.4	<0.01*
	1 year ago	65	38.2	25	17.4	35	48.6	-	-	
	2 years ago	69	40.6	56	38.9	20	27.8	15	36.6	
	≥3 years ago	13	7.7	18	12.5	6	8.4	-	-	

\*p<0.05 was considered statistically significant using Pearson Chi Square test

Table 4: Mean Comparison of Age, BMI, Hemoglobin, TLC and Platelets with Menarche Age

Variables	Age of menarche								p-value
	≤14 years		15 years		>15 years		Not remember		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Age (years)	26.39	4.70	25.20	3.75	25.19	5.14	24.17	4.85	0.012*
BMI (Kg/m <sup>2</sup> )	28.11	3.05	27.66	3.73	30.51	5.30	29.21	2.50	<0.01*
Hemoglobin	10.94	1.03	10.82	1.22	10.45	1.13	10.47	1.13	<0.01*
TLC	7.31	2.10	8.50	2.37	7.83	2.24	7.88	1.69	<0.01*
platelets	213.39	55.83	227.30	59.36	226.14	62.27	203.80	42.21	0.03*

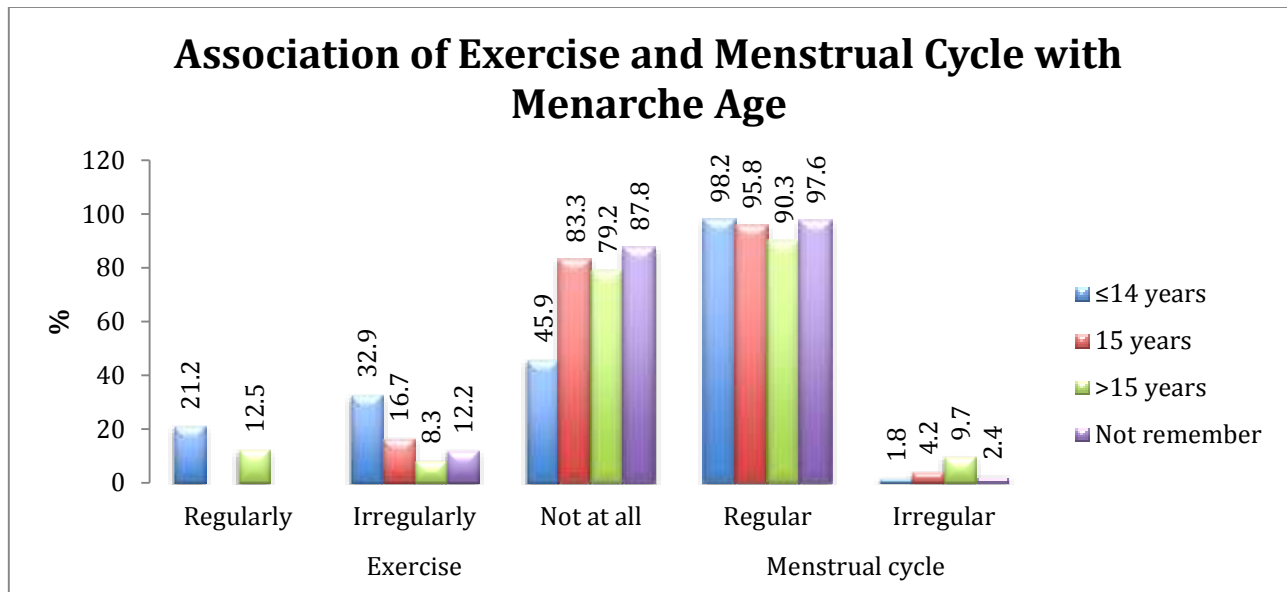
\*p<0.05 was considered statistically significant using One way ANOVA

Table 5: Risk Estimation for Menarche age ≤14 years using Binary Logistic Regression

Risk factors	Univariate	Multivariate
	Odds ratio (95% C.I.)	Odds ratio (95% C.I.)
Exercise irregularly	0.5(0.2-1.1)	0.5(0.1-2.6)
Eating outside excessively	19.3*(4.3-86.8)	67.7* (9.1-502)
Married for >3 years	1.1(0.8-1.7)	4.7* (1.1-20.8)
Threaten Miscarriage	6.4* (2.9-13.8)	21.4* (5.6-81)
GDM	3.4* (1.7-7)	7.5* (1.7-33.7)
Hemoglobin	1.2* (1-1.5)	1.1(0.8-1.6)
TLC	0.8(0.8-0.9)	0.8(0.7-1)
Platelets	0.99* (0.91 – 0.99)	0.99 (0.98 – 1.0)
Regular menstrual cycle	0.3(0.1-1)	0.5(0.1-3.7)
Length of cycle 25 – 26 days	3.6* (1.1-12.6)	2.5(0.3-21.1)
Bleeding 3 – 4 days	4.3* (2-9.4)	2.8(0.6-12.6)
Bleeding 5 – 6 days	8.3* (3.8-18.2)	6.4* (1.2-34.9)
Bleeding 6 – 7 days	18.7* (5.4-64)	1.7(0.1-26.1)
Pregnant	0.7(0.4-1)	0.2* (0-0.6)
Trying for Conception 3-6 months	2.5(0.2-26.1)	3.6(0.2-66.5)
First Pregnancy 1 year ago	2.6* (1.4-4.8)	0.5(0.1-1.8)

\*p<0.05 was considered statistically significant for odds ratio

Multivariate model was adjusted for age and BMI



Bar Chart 2:

## DISCUSSION

In this study it was seen that the women having less than 3 days of bleeding, prolonged cycle length (31-35 days) and age of menarche more than 15 years, they were associated with delayed time to achieve a pregnancy.

Previous studies comparing cycle length and time to achieve pregnancy have shown conflicting results (Lauren A. Wise et al, 2011), in their study they concluded that, shorter cycle length was associated with delayed time to pregnancy<sup>12,13</sup>.

Previous studies comparing AOM and the time to achieve pregnancy shows similar association of fecundity (time to achieve pregnancy) as is depicted in our study<sup>14</sup>. We found no clear association between bleeding days and TTP (time to achieve pregnancy), but it is difficult to comment and compare with other studies due to the different ways the menstruation days were categorized. We initially excluded the women with irregular cycles, but it is a well-known risk factor for decline in fertility of a patient, therefore we included the patients with irregular cycles too<sup>15,16</sup>. Also there was no association of the women's age at achieving a pregnancy in our study, this is a similar finding in another study (Guldbrandsen et al.). Increase BMI was found in the group with late AOM (ie. >15 years) in our study, but it has been shown that the probability of pregnancy is reduced by 5% per unit of BMI exceeding 29 kg/m<sup>2</sup> (17). This study included the women who achieve a pregnancy recently or had first conception within 2-years, as the recall ability (about the menarche, TTP etc.) decreases with the increase time duration<sup>18</sup>.

The strength of our study is this is perhaps the first study in our region taking account of menstrual factors and its correlation in time to achieve a pregnancy. Prior studies assessing the validity of self-reported age at menarche in adulthood<sup>19</sup>, and the presence of over 9.6% missing data for age at menarche in this study indicate that women have difficulty in remembering details about their adolescent menstrual history.

Therefore from this study we concluded that late menarche (>15 years), prolonged cycles and decrease bleeding days are the associated factors with decrease fecundity in terms of prolonged time to achieve pregnancy.

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