



CODEN [USA]: IAJ PBB

ISSN : 2349-7750

**INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES**

SJIF Impact Factor: 7.187

<https://doi.org/10.5281/zenodo.5865389>Available online at: <http://www.iajps.com>

Research Article

**ASSOCIATION BETWEEN MENARCHEAL AND
MENOPAUSAL AGES AND SOCIO-DEMOGRAPHIC AND
HEALTH CHARACTERISTICS: A CROSS-SECTIONAL STUDY**Joud Weal Alghamdi¹, Mufareh Asiri², Ibtesam ALshammari², Maya ALyahya¹,
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Article Received: December 2021 Accepted: December 2021 Published: January 2022

Abstract:

Background: Menarche is a biological phenomenon in women's bodies, which points out a critical life cycle stage. The girls begin to menstruate for the first time, which is continued for four to five days. With increasing age, the reproductive life of women ends with menopause.

Objectives: To measure the association between menarcheal and menopausal ages and other socio-demographic and health factors.

Methods: We performed a cross-sectional study among females in Saudi Arabia. The sample size was 384, and it was calculated by Epi Info software. Data collected included the participants' socio-demographic characteristics, delivery-related questions, and questions about menarche and menopause. We used SPSS to analyze the data.

Results: A total of 414 females responded to our questionnaire, all of which were included in our analysis. Most females had menarche during 10 to 12 years (56.5%), with irregular patterns (72.7%), and this irregularity continued to 12 months and more (64.3%). Most females reached their menopause (74.9%), with a gradually stopping pattern (30.4%), and the most common age group for menopause was from 41 to 50 years old (61.8%).

Conclusions: We found that the socio-demographic and health factors are related to the age of menarche and menopause. Our study concluded that menarcheal age was a significant association with marriage age, nature of delivery, educational level, income, having chronic diseases, practicing sports, having regular menstruation, duration of irregular menstruation, having previous operations, using chemo/radiotherapy, happening of menopause and its age categories. At the same time, menopausal age was a significant association with all factors except smoking status.

Keywords: Menarcheal Age, Menopausal Age, Socio-Demographic, Health Characteristics, Cross-Sectional Study

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Please cite this article in press Joud Weal Alghamdi *et al.*, Association Between Menarcheal And Menopausal Ages And Socio-Demographic And Health Characteristics: A Cross-Sectional Study, Indo Am. J. P. Sci, 2022; 09(01).

INTRODUCTION:

Menarche is a biological term that Kisch first introduced in 1910 [1]. It gets expression in women's bodies as a biological phenomenon, which points out a critical life cycle stage [2]. Menarche indicates the specific stage of the first periodical regular blood flow from the womb in all the healthy normal females [2]. At a particular level of biological development, the girls begin to menstruate for the first time, which is continued for four to five days. The menstrual cycle is usually one of twenty-eight days, and the estimated blood loss is between 50 ml to 200 ml [3]. Early age of menarche is evident through physical and genetic changes, such as the increased risk of breast cancer and other gynecological cancers [4], risk of type 2 diabetes [5], obesity [6], cardiovascular disease [7], and psychological disturbance [8]. With increasing age, various morphological and physiological changes are accompanied in women's life. The reproductive life of women ends with varying degrees of suddenness with menopause [9].

The previous Saudi studies showed that the environmental and genetic factors have a role in influencing the age at menarche [10], and the girls attain menarcheal age earlier than their mothers [11]. However, the previous literature discusses the association between menarcheal age and other socio-demographic and health factors; only one paper discuss the association between menopausal age and other socio-demographic and health factors [12]. So, this study aims to measure the association between menarcheal and menopausal ages and other socio-demographic and health factors.

Methods

- Study Design and Setting

This study was a cross-sectional study based in Saudi Arabia.

- Selection Criteria and Sample Size

The study included the female population of Saudi Arabia, older than 18 years. We excluded females less than 18 years. The sample size was calculated by Epi Info STAT CALC version (7.2.4). There are 10,011,448 people in Saudi Arabia [13], with a confidence level of 95% and an acceptable margin of error of 5%. The expected frequency was 50%, the sample was estimated to be 384.

- Data Collection

Data collected using a questionnaire comprises three sections; the first part included the participants' socio-demographic characteristics, such as age, sex,

nationality, marital status, educational level, smoking status, having chronic diseases, and family history of chronic disease. The second part consisted of the delivery-related questions: marriage age, number of labour, nature of labour, and number of children. The third part was about menarche and menopause as menarcheal age, regularity of menstruation, irregularity duration, happening menopause, how menopause happening, menopause age, having an operation, and taking any chemo/radiotherapy.

- Statistical Analysis

The Statistical Package for Social Sciences (SPSS) version 26 was used to analyze the data (IBM Corp., Armonk, NY). The collected data were summarized and presented in suitable tables. Continuous nonnormally distributed variables are presented as a median and interquartile range, and categorical variables are presented as numbers and percentages. Statistical significance was evaluated using the Kruskal-Wallis test for continuous variables and a Chi-square test for categorical variables as appropriate.

- Ethical considerations

The questionnaire started with a brief explanation of its objective and intent and reminded participants that their participation was voluntary. The study was observational on human subjects, so informed consent was taken from participants who answered "yes" to participate. Ethical approval was obtained from the Research Ethical Committee (REC).

RESULTS:

A total of 414 females responded to our questionnaire, all of which were included in our analysis.

- Baseline Characters of Females

The median age was 55, while the median marriage age was 17. The results in **Table 1** showed that most of the participants were Saudis 332 (80.2%), married 257 (62.1%), did not learn 146 (35.3%), not smokers 387 (93.5%), having no chronic diseases 217 (52.4%), and family history of chronic disease 197 (47.6%). Most of the participants had twice times or more of births 380(92.8%), choosing the normal delivery 286 (69.1%), and having five or more children 269 (65%).

- Association between Menarcheal age and Socio-Demographic and Health Factors

Most females had menarche among 10 to 12 years old (56.5%), with irregular menstruation (72.7%), and the irregularity continues to 12 months, and more (64.3%) see (**Table 1**).

Our findings in **Table 2** showed a significant association between menarcheal age and marriage age, nature of delivery, educational level, having chronic diseases, family history of chronic disease, having regular menstruation, duration of irregular menstruation, having previous operations, using chemo/radiotherapy, happening of menopause and its age categories (p-value = 0.016, 0.001, 0.001, 0.001, 0.016, 0.002, 0.003, 0.001, 0.001, 0.001, 0.002, and 0.003), respectively.

- **Association between Menopausal Age and Socio-Demographic and Health Factors**

Most females reached their menopause (74.9%), with a gradually stopping pattern (30.4%), and the most common age group for menopause was from 41 to 50 years old (61.8%) see (**Table 1**).

Our findings in **Table 3** showed a significant association between menopausal age and all socio-demographic and health factors except the smoking status (p-value = 0.077).

Table 1: Baseline Characters of Females

Variables	N	%
Age Median (IQR)	55	13
Marriage Age Median (IQR)	17	4
Nationality		
Saudi	332	80.2
Non-Saudi	82	19.8
Marital Status		
Single	21	5.1
Married	257	62.1
Widow	65	15.7
Divorced / Separated	71	17.1
The number of births?		
None	16	3.9
Once	14	3.4
Twice or more	384	92.8
Nature of Delivery		
Normal Delivery	286	69.1
Normal Delivery with using a suction device	16	3.9
Normal and Cesarean Delivery	81	19.6
Cesarean Delivery	31	7.5
Number of Children		
Having no Children	13	3.1
One Child	15	3.6
2 – 4 Children	117	28.3
5 or more Children	269	65
Educational Level		
Primary Level	101	24.4
Average Level	67	16.2
Secondary Level	38	9.2
University or Above	62	15
I did not learn	146	35.3
Working		
Working	72	17.4
Do not work	342	82.6
Smoker		
Yes	27	6.5
No	387	93.5

Having Chronic Diseases		
Yes	197	47.6
No	217	52.4
Do you have		
Diabetes	7	18.9
Hypertension	19	9.6
Thyroid disease	19	10.6
Family history of chronic disease		
yes	11	8.3
No	25	15
Menarche Age		
Less than 10 years	45	10.9
10 – 12 years	234	56.5
13 – 15 years	112	27.1
16 – 17 years	23	5.6
Having Regular Menstruation		
Yes	113	27.3
No	301	72.7
Duration of irregular menstruation		
From 3 Months to 11 Months	35	8.5
12 Months or More	266	64.3
Operations (as)		
Yes	25	6
No	389	94
Using Chemo / Radio Thereby		
Yes	8	1.9
No	406	98.1
Happening of Menopause		
Yes	310	74.9
No	104	25.1
Happening of Menopause		
Became irregular then stopped	104	25.1
Gradually Stopped	126	30.4
Suddenly Stopped	54	13
I don't remember	26	6.3
Not applicable	104	25.1
Menopause Age Groups		
30 – 40 Years	14	3.4
41 – 50 Years	256	61.8
51 – 55 Years	40	9.7
Not applicable	104	25.1

Notes: Categorical data were presented as numbers (N) and percentages (%), while continuous nonnormally distributed variables were presented as a median and interquartile range (IQR).

Table 2: Association between Menarcheal age and Socio-Demographic and Health Factors

Variables	Menarcheal Age								P-Value
	Less than ten years		10 – 12 years		13 – 15 years		16 – 17 years		
	N	%	N	%	N	%	N	%	
Age Median (IQR)	55	15	55	11	55	14	55	15	0.124
Marriage Age Median (IQR)	16	2	17	4	16	4	17	4	0.016
Nationality									
Saudi	37	11.1	192	57.8	85	25.6	18	5.4	0.576
Non-Saudi	8	9.8	42	51.2	27	32.9	5	6.1	
Marital Status									
Single	0	0	10	47.6	9	42.9	2	9.5	0.110
Married	35	13.6	142	55.3	65	25.3	15	5.8	
Widow	8	12.3	39	60	17	26.2	1	1.5	
Divorced / Separated	2	2.8	43	60.6	21	29.6	5	7	
The number of births?									
None	2	12.5	5	50	6	37.5	0	0	0.743
Once	1	7.1	10	71.4	3	21.4	0	0	
Twice or more	42	10.9	216	56.3	103	26.8	23	6	
Nature of Delivery									
Normal Delivery	35	12.2	174	60.8	67	23.4	10	3.5	0.001
Normal Delivery with using a suction device	2	12.5	4	25	10	62.5	0	0	
Normal and Cesarean Delivery	3	3.7	37	45.7	30	37	11	13.6	
Cesarean Delivery	5	16.1	19	61.3	5	16.1	2	6.5	
Number of Children									
Having no Children	2	15.4	8	61.5	3	23.1	0	0	0.298
One Child	1	6.7	9	60	5	33.3	0	0	
2 – 4 Children	5	4.3	70	59.8	33	28.2	9	7.7	
Five or more Children	37	13.8	147	54.6	71	26.4	14	5.2	
Educational Level									
Primary Level	10	9.9	59	58.4	30	29.7	2	2	0.001
Average Level	4	6	31	46.3	24	35.8	8	11.9	
Secondary Level	0	0	19	50	16	42.1	3	7.9	
University or Above	4	6.5	27	43.5	25	40.3	6	9.7	
I did not learn	27	18.5	98	67.1	17	11.6	4	2.7	
Working									
Working	8	11.1	35	48.6	26	36.1	3	4.2	0.271
Do not work	37	10.8	199	58.2	86	25.1	20	5.8	
Family history of chronic disease									
yes	11	8.3	56	42.1	54	40.6	12	9	0.001
no	25	15	104	62.3	31	18.6	7	4.2	
Smoker									
Yes	4	14.8	11	40.7	11	40.7	1	3.7	0.276

No	41	10.6	223	57.6	101	26.1	22	5.7	
Having Chronic Diseases									
Yes	28	14.2	113	57.4	51	25.9	5	2.5	0.016
No	17	7.8	121	55.8	61	28.1	18	8.3	
Do you have									
Diabetes	7	18.9	15	40.5	15	40.5	0	0	0.002
Hypertension	19	9.6	100	50.8	65	33	13	6.6	
Thyroid disease	19	10.6	119	66.1	32	17.8	10	5.6	
Having Regular Menstruation									
Yes	10	8.8	51	36.3	41	36.3	11	9.7	0.003
No	35	11.6	183	23.6	71	23.6	12	4	
Duration of irregular menstruation									
From 3 Months to 11 Months	0	0	22	62.9	13	37.1	0	0	0.001
12 Months or More	35	13.2	161	60.5	58	21.8	12	4.5	
Not applicable	10	8.8	51	45.1	41	36.3	11	9.7	
Operations (as)									
Yes	0	0	9	36	10	40	6	24	0.001
No	45	11.6	225	57.8	102	26.2	17	4.4	
Using Chemo / Radio Thereby									
Yes	0	0	1	12.5	2	25	5	62.5	0.001
No	45	11.1	233	57.4	110	27.1	18	4.4	
Happening of Menopause									
Yes	32	10.3	186	60	76	24.5	16	5.2	0.100
No	13	12.5	48	46.2	38	34.6	7	6.7	
Happening of Menopause									
Became irregular then stopped	16	15.4	50	48.1	28	26.9	10	9.6	0.002
Gradually Stopped	8	6.3	79	62.7	34	27	5	4	
Suddenly Stopped	2	3.7	43	79.6	9	16.7	0	0	
I don't remember	6	23.1	13	50	6	23.1	1	3.8	
Not applicable	13	12.5	49	47.1	35	33.7	7	6.7	
Menopause Age Groups									
30 – 40 Years	0	0	12	85.7	0	0	2	14.3	0.003
41 – 50 Years	22	8.6	154	60.2	68	26.6	12	4.7	
51 – 55 Years	10	25	20	50	8	20	2	2	
Not applicable	13	12.5	48	46.2	36	34.6	7	6.7	

Notes: Categorical data were presented as numbers (N) and percentages (%), while continuous nonnormally distributed variables were presented as a median and interquartile range (IQR). P-values \leq of 0.05 were considered statistically significant.

Table 3: Association between Menopausal Age and Socio-Demographic and Health Factors

Variables	Menopausal Age								P-Value
	30 – 40 Years		41 – 50 Years		51 – 55 Years		Not applicable		
	N	%	N	%	N	%	N	%	
Age Median (IQR)	50	17	56	6	55.5	5	44	4	0.001
Marriage Age Median (IQR)	20	2	17	4	16	4	17.5	7	0.001
Nationality									
Saudi	14	4.2	193	58.1	28	8.4	97	29.2	0.001
Non-Saudi	0	0	63	76.8	12	14.6	7	8.5	
Marital Status									
Single	0	0	11	52.4	4	19	6	28.6	0.002
Married	12	4.7	145	56.4	23	8.9	77	30	
Widow	0	0	52	80	9	13.8	4	6.2	
Divorced / Separated	2	2.8	48	67.6	4	5.6	17	23.9	
The number of births?									
None	0	0	2	12.5	0	0	14	87.5	0.001
Once	0	0	2	14.3	0	0	12	85.7	
Twice or more	14	3.6	252	65.6	40	10.4	78	20.3	
Nature of Delivery									
Normal Delivery	10	3.5	179	62.6	37	12.9	60	21	0.001
Normal Delivery with using a suction device	0	0	11	68.8	0	0	5	31.3	
Normal and Cesarean Delivery	4	4.9	52	64.2	3	3.7	22	27.2	
Cesarean Delivery	0	0	14	45.2	0	0	17	54.8	
Number of Children									
Having no Children	0	0	2	15.4	0	0	11	84.6	0.001
One Child	0	0	4	26.7	0	0	11	73.3	
2 – 4 Children	0	0	61	52.1	12	10.3	44	37.6	
5 or more Children	14	5.2	189	70.3	28	10.4	38	14.1	
Educational Level									
Primary Level	0	0	79	78.2	14	13.9	8	7.9	0.001
Average Level	2	3	49	73.1	2	3	14	20.9	
Secondary Level	4	10.5	11	28.9	1	2.6	22	57.9	
University or Above	0	0	6	9.7	1	1.6	55	88.7	
I did not learn	8	5.5	111	76	22	15.1	5	3.4	
Working									
Working	2	2.8	13	18.1	3	4.2	54	75	0.001
Do not work	12	3.5	243	71.1	37	10.8	50	14.6	
Family history disease									
yes	0	0	95	71.4	12	9	26	19.5	0.001

no	12	7.2	109	65.3	20	12	26	15.6	
Smoker									
Yes	0	0	23	85.2	1	3.7	3	11.1	0.077
No	14	3.6	233	60.2	39	10.1	101	26.1	
Having Chronic Diseases									
Yes	0	0	154	78.2	30	15.2	13	6.6	0.001
No	14	6.5	102	47	10	4.6	91	41.9	
Do you have									
Diabetes	0	0	18	48.6	6	16.2	13	35.1	0.001
Hypertension	0	0	132	67	15	7.6	50	25.4	
Thyroid disease	14	7.8	106	58.9	19	10.6	41	22.8	
Menarche Age									
Less than 10 years	0	0	22	48.9	10	22.2	13	28.9	0.003
10 – 12 years	12	5.1	154	65.8	20	8.5	48	20.5	
13 – 15 years	0	0	68	60.7	8	7.1	36	32.1	
16 – 17 years	2	8.7	12	52.2	2	8.7	7	30.4	
Having Regular Menstruation									
Yes	0	0	9	8	4	3.5	100	88.5	0.001
No	14	4.7	247	82.1	36	12	4	1.3	
Duration of irregular menstruation									
From 3 Months to 11 Months	0	0	34	97.1	0	0	1	2.9	0.001
12 Months or More	14	5.3	213	80.1	36	13.5	3	1.1	
Not applicable	0	0	9	8	4	3.5	100	88.5	
Operations (as)									
Yes	4	16	18	72	1	4	2	8	0.001
No	10	2.6	238	61.2	39	10	102	26.2	
Using Chemo / Radio Thereby									
Yes	0	0	5	62.5	3	37.5	0	0	0.031
No	14	3.4	251	61.8	37	9.1	104	25.6	
Happening of Menopause									
Yes	14	4.5	256	82,6	40	12,9	0	0	0.001
No	0	0	0	0	0	0	104	100	
Happening of Menopause									
Became irregular then stopped	2	1.9	88	84.6	14	13.5	0	0	0.001
Gradually Stopped	0	0	108	85.7	18	14.3	0	0	
Suddenly Stopped	12	22.2	34	63	8	14.8	0	0	
I don't remember	0	0	25	96.2	0	0	1	3.8	
Not applicable	14	3.4	1	1	0	0	103	99	

Notes: Categorical data were presented as numbers (N) and percentages (%), while continuous nonnormally distributed variables were presented as a median and interquartile range (IQR). P-values \leq of 0.05 were considered statistically significant.

DISCUSSION:

In women's life, menarche and menopause are considered important physiological episodes. According to our results, the socio-demographic and health factors are related to the age of menarche and menopause.

In our study, the median marriage age was 17, agreeing with Z. A. Babay et al. [14] study that showed the most common marriage age is between 15 to 19 years old in Saudi Arabia. According to our finding, having five or more children was the most common (65%), while Z. A. Babay et al. [14] study showed that having from one to three children is the most common (34.9%). In our study, most females had menarche among 10 to 12 years old (56.5%), while Z. A. Babay et al. [14], and Ranjan Kumar Biswas and A.K. Kapoor [2] studies showed that 13-years old is the most common age for menarche (34.9%), (53.6%), respectively. Ranjan Kumar Biswas and A.K. Kapoor [2], and Pakala CR et al. [15] studies showed that 14-years old was the most common age for menarche among mothers or students (48.1%), (31%), respectively. Al Alwan et al.'s [11] findings presented that the age from 11 to 14 was the commonest for menarche 239 (90.2%), agreeing with our results and previous literature. Most of the females in our study had irregular patterns of menstruation (72.7%), while Pakala CR et al. [15] findings showed (81.3%) females had no irregular patterns of menstruation. In our study, most females reached their menopause from 41 to 50 years old (61.8%), while Ranjan Kumar Biswas and A.K. Kapoor [2] that presented 44-years old was the most familiar age for menopause (34.4%).

The Limitation and Strength Points

Our cross-sectional study included 414 participants, more than Al Alwan et al.'s [11] with only two-hundred and sixty-five girls. In comparison, our sample was less than two previous studies Z. A. Babay et al. [14] with 989 participants, and W. Greer et al. [12] with 858 participants from Saudi Arabia.

CONCLUSIONS:

In conclusion, we found that the socio-demographic and health factors are related to the age of menarche and menopause. Our study concluded that menarcheal age was a significant association with marriage age, nature of delivery, educational level, family history of chronic disease, having chronic diseases such as (DM/ HTN/ THYROID), having regular menstruation, duration of irregular menstruation, having previous operations, using chemo/radiotherapy, happening of menopause and its age categories.

While the menopausal age was a significant association with age, marriage age, nationality, marital status, number of births, nature of delivery, number of children, educational level, having chronic diseases, , menarcheal age, having regular menstruation, duration of irregular menstruation, having previous operations and using chemo/radiotherapy.

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