Journal of Pioneering Medical Sciences
Received: February 19, 2026 | Accepted: June 10, 2026 | Published: September 05, 2026
Volume 15, Issue 08, Pages 223-228
DOI https://doi.org/10.47310/jpms2026150829

Prevalence of Abnormal Serum Prolactin Levels among Married Women Attending Al-Batool Teaching Hospital in Diyala Province /Iraq

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Abstract: **Background:** Prolactin hormone disorder is considered an increasingly common endocrine dysfunction that affects the hypothalamic-pituitary axis. Prolactin secretion is stimulated by dopamine antagonists, in addition to thyrotropin-releasing hormone (TRH). **Objective:** The study aims to determine the prevalence of abnormal Prolactin levels (hyperprolactinemia and hypoprolactinemia) in married Females. **Patients and methods:** The cross-sectional study included 1,059 married female participants who attended Al-Batool Teaching Hospital in Diyala, Iraq between January 2024 and March 2025 at the same hospital. The demographic data of the patients participating in the study were collected from ward records after obtaining informed consent. At the same time, prolactin levels were measured in the hospital's biochemistry laboratories using the German-made Cobas e 411 analyser. **Results:** Among married female participants, 46.4% had hyperprolactinemia, 9.8% had hypoprolactinaemia, and 43.8% showed normal levels. Prolactin levels were not significantly associated with marriage duration ($p = 0.006$), number of children ($p = 0.018$), and sleep duration ($p = 0.084$). Longer marriages and fewer children correlated with higher prolactin levels. Additionally, a negative correlation ($r = -0.084$) between sleep duration and prolactin suggests that shorter sleep may elevate prolactin, potentially reflecting the physiological impact of chronic stress and reproductive strain. **Conclusion:** The current study noted that there is a high prevalence of hyperprolactinemia among married women at Al-Batool Teaching Hospital in Diyala province, significantly linked to longer marriage duration, fewer children, and shorter sleep duration.

Key Words: Prevalence, Prolactin, Hormone, Hyperprolactinemia, Married Women

INTRODUCTION

The increasing prevalence of hormonal disorders is one of the most pressing emerging public health concerns. It has significant negative impacts on women's psychological and reproductive health. Hyperprolactinemia, which is characterised by a dysregulation of prolactin levels, is considered one of the most common of these disorders, particularly among married women [1].

Prolactin is a hormone that plays a central role in lactation and the development of mammary glands and is secreted by the anterior pituitary gland. In addition, it regulates reproductive hormones in both women and men. The primary regulator of this hormone is dopamine by inhibits lactotroph activity [2].

Hyperprolactinemia may cause serious health complications, including infertility, reduced libido, menstrual irregularities, and mood disturbances [3,4,5].

Furthermore, prolactin dysregulation is correlated with several psychological, biological, and pharmacological factors. Increased levels of prolactin have been observed in cases of thyroid dysfunction and in individuals taking certain medications [6], like hormonal contraceptives or antipsychotics and oxidative stress [7,8].

Studies found that hyperprolactinemia affects 8 to17% of women of reproductive age suffering from infertility, which confirms the hormone's close connection to psychological well-being and reproductive function [9].

Despite this, data regarding the prevalence of hyperprolactinemia among married women, especially in the Middle East region, remain relatively scarce. However, few studies focused on infertile women have noted that approximately 24% of this population exhibit elevated prolactin levels [10]. This finding affirms the health challenge that may be increased due to limited public awareness in Arab societies.

Locally, studies reported that there is an association between prolactin imbalance and increased blood pressure during pregnancy, as well as its effect on the hormones LH and FSH. Other study observed a significant elevation in these two hormones alongside a marked increase in prolactin levels. Moreover, another study found a clear link between elevated prolactin and infertility among some Iraqi women. Hyperprolactinemia was also strongly associated with polycystic ovary syndrome (PCOS). Additionally, researchers have indicated that low prolactin levels were associated with the presence of metabolic syndrome.

Given the growing attention to women's health, especially that of married women, there is an increasing need for research focused on the prevalence of prolactin disorders. In this context, the present study aims to analyse the prevalence rate of prolactin hormone disorder among married women attending Al-Batool Teaching Hospital in Diyala Province, Iraq.

MATERIAL AND METHODS

Study design and participants

This cross-sectional study was conducted at Al-Batool Teaching Hospital in Diyala Province, Iraq, between January 2024 and March 2025. It included women who visited the hospital for the evaluation of hormonal disorders, particularly prolactin-related abnormalities. Ethical approval was obtained from the University of Diyala, College of Medicine, under Code (MAS317). A total of 1,059 female patients who consented to participate were included in the study, as all patients visited the hospital for diagnostic and therapeutic purposes. The study questionnaire was completed by the participants themselves and included informed consent, name, age, address, number of sleeping hours, occupation, duration of marriage, and number of children. All of whom were referred for prolactin hormone testing. Prolactin levels were measured using the Roche Cobas E411 analyser (Germany). Elevated, decreased, or normal prolactin levels were determined by comparing the patients' results with the standard reference range provided by the test kit manufacturer for normal physiological values, which indicated that the normal value for females should be between 4.3 and 28.7 ng/ml.

Inclusion and Exclusion Criteria

Only married females aged between 25 and 50 years, who were referred by a gynaecologist for prolactin hormone testing, were included in the study. Women with chronic heart diseases, diabetes, hypertension, kidney failure were excluded.

Statistical Analysis

Data were organised and analysed using Microsoft Excel 2013 and SPSS Statistics V21. Descriptive statistics were employed, including cross-tabulations and chi-square tests to examine the relationships between prolactin levels and various demographic factors.

RESULT

The study included a total of 1,059 participants, with demographic distribution focusing on age group, occupation,

Table 1: Demographic Characteristics of Married Females Attending Al-Batool Teaching Hospital

		Frequency	Percent	Mean+SD
Age group	25-30 y	236	22.3	36.26 +5.370
	31-35 y	252	23.8	
	36-40 y	363	34.3	
	41 -45 y	182	17.2	
	46 -50 y	26	2.5	
	Total	1059	100.0	
Occupation	Employee	232	21.9	
	Housewife	827	78.1	
	Total	1059	100.0	
Duration of marriage	less 5 y	10	.9	7.81 + 4.135
	5-10 y	495	46.7	
	11-15 y	340	32.1	
	16-20 y	214	20.2	
	Total	1059	100.0	
Number of children	1	448	42.3	1.86 + 1.03
	2	437	41.3	
	3	87	8.2	
	4	51	4.8	
	5	33	3.1	
	6	3	0.3	
	Total	1059	100.0	
average hours of sleep do you get per night	less than 6 h	509	48.1	6.82+2.426
	6-8 h	142	13.4	
	9-12 h	408	38.5	
	Total	1059	100.0	

Table 2: Classification of Prolactin Test Results in Married Females Attending Al-Batool Teaching Hospital

Classification	Frequency	Percent
Hyperprolactiemia	491	46.4
Hypoprolactiemia	104	9.8
Normal	464	43.8
Total	1059	100.0

Table 3: Prolactin Test Results by Occupation in Married Females Attending Al-Batool Teaching Hospital

Parameters		Classification						p-value
		Hyperprolactinemia		Hypoprolactinemia		Normal		
		N	Percentage	N	Percentage	N	Percentage	
Occupation	Employee	109	22.2	19	18.3	104	22.4	0.05
	Housewife	382	77.8	85	81.7	360	77.6	
	Total	491	100.0	104	100.0	464	100.0	

Table 4: Factors Associated with Prolactin Test Results in Married Females Attending Al-Batool Teaching Hospital

Parameters		Classification						p-value
		Hyperprolactinemia		Hypoprolactinemia		Normal		
		N	Percentage	N	Percentage	N	Percentage	
Duration of marriage	Less 5 years	7	1.4	1	1.0	2	0.4	0.006
	5-10 years	234	47.7	50	48.1	211	45.5	
	11-15 years	146	29.7	38	36.5	156	33.6	
	16-20 years	104	21.2	15	14.4	95	20.5	
	Total	491	100.0	104	100.0	464	100.0	
Number of children	1	204	41.5	40	38.5	204	44.0	0.018
	2	204	41.5	46	44.2	187	40.3	
	3	42	8.6	7	6.7	38	8.2	
	4	24	4.9	7	6.7	20	4.3	
	5	15	3.1	4	3.8	14	3.0	
	6	2	0.4	0	0.0	1	0.2	
	Total	491	100.0	104	100.0	464	100.0	
How many hours of sleep do you get per night on average	Less than 6 h	265	54.0	67	64.4	177	38.1	0.084
	6-8 h	61	12.4	13	12.5	68	14.7	
	9-12 h	165	33.6	24	23.1	219	47.2	
	Total	491	100.0	104	100.0	464	100.0	

duration of marriage, number of children, and sleep patterns. Regarding age, the largest group was between 36 and 40 years old (34.3%), followed by the 31 to 35 age group (23.8%). In terms of occupation, the majority of participants were housewives (78.1%), followed by employed women (21.9%). As for the duration of marriage, 46.7% of the women had been married for 5 to 10 years. With respect to sleep duration, 48.1% of the participants reported getting less than 6 hours of sleep per night, as shown in Table 1.

In addition, the study found that 46.4% of participants had elevated prolactin levels, while 43.8% had levels within the normal reference range, and 9.8% had below-normal prolactin levels. These classifications were based on comparison with the standard reference values provided by the Roche test kit, as shown in Table 2.

When prolactin levels were analysed according to occupation, the study showed that among employed women, 22.2% had elevated serum prolactin levels, 18.3% had decreased levels, and 22.4% had normal levels.

Interestingly, the study found that housewives exhibited hyperprolactinemia levels in 77.8% of their group, Hypoprolactinemia levels in 81.7%, while 77.6% had normal prolactin levels. The p-value of 0.05 indicates a statistically significant difference in serum prolactin levels between employed women and housewives as in Table 3.

Additionally, the study observed an association between prolactin levels and certain physiological factors such as duration of marriage, number of children, and average sleep hours among the participating women. The prevalence of hyperprolactinemia was found to be statistically significant among women who had been married for 5 to 10 years ($p = 0.006$), as well as among those with one or two children ($p = 0.018$). However, the average number of sleep hours did not show a statistically significant association with prolactin levels although most women with hyperprolactinemia sleep less than 6 hours per day as in the Table 4.

According to Pearson correlation coefficients between the variables, the study identified statistically significant correlations at the $p<0.01$ level. A strong positive correlation was observed between duration of marriage and age ($r = 0.912$), as well as between number of children and duration of marriage ($r = 0.574$). Conversely, there was a notable negative correlation between prolactin levels and average sleep hours ($r = -0.084$), and a weak positive correlation between prolactin levels and number of children ($r = 0.114$).

Table 5: Correlation Between Demographic and Prolactin Levels in Married Females Attending Al-Batool Teaching Hospital

Correlations						
Parameters		Age	Level of prolactin	Duration of marriage	Number of children	Average sleep hours per night
Age	Pearson Correlation	1	0.048	0.912**	0.559**	-0.028-
	Sig. (2-tailed)	-	0.120	0.000	0.000	0.366
	N	1059	1059	1059	1058	1059
Level of prolactin	Pearson Correlation	0.048	1	0.043	0.049	-0.084-**
	Sig. (2-tailed)	0.120	-	0.162	0.114	0.006
	N	1059	1059	1059	1058	1059
Duration of marriage	Pearson Correlation	0.912**	0.043	1	0.574**	-0.005-
	Sig. (2-tailed)	0.000	0.162	-	0.000	0.875
	N	1059	1059	1059	1058	1059
Number of children	Pearson Correlation	0.559**	0.049	0.574**	1	0.019
	Sig. (2-tailed)	0.000	0.114	0.000	-	0.538
	N	1058	1058	1058	1058	1058
Average sleep get per night	Pearson Correlation	-0.028-	-0.084-**	-0.005-	0.019	1
	Sig. (2-tailed)	0.366	0.006	0.875	0.538	-
	N	1059	1059	1059	1058	1059

**Correlation is significant at the 0.01 level (2-tailed)

DISCUSSION

The study highlighted several important factors that could be key contributors affecting prolactin levels among married women. According to the age group visiting the hospital for suspected prolactin disorders was 36–40 years, 31–35 years by percentage 34.3% and 23.8%, respectively.

The range of this age may be due to increasing of psychological, reproductive, and social demands, which may led to hormonal imbalances. Where studies have reported that prolactin levels may vary according to age and tend to peak during the reproductive years because of endocrine responses related to stress or pregnancy history, or hormonal fluctuations [11].

Homemakers were clearly dominated in this study; 78.1% of total cases had abnormal Prolactin. This may be because of several factors, including health education, potentially reduced access to healthcare and increased caregiving responsibilities, or decreased social engagement; these factors could affect hormonal health. Sobrinho *et al.* suggested that psychosocial stress in non-working women may be correlated with elevated prolactin levels due to dopamine inhibition triggered by the aforementioned factors [12].

Half of the participants of this study had been married for 5 to 9 years, which represents the age range that falls within the peak of child-rearing and childbearing, which chaperones both emotional, psychological and physical stress.

These factors could influence prolactin levels. Also, infertility treatments or gynaecological interventions can interfere with the regulation of the prolactin hormone.

48.1% of participants have recorded sleeping less than 6 hours per night; this reason is represented as sleep deprivation, which is considered a risk factor that affects hormonal regulation, especially prolactin [13]. Numerous studies have indicated that chronic sleep deprivation hurts endocrine function [14].

The study found that 46.4% of participants had hyperprolactinemia. It could be a result of endocrine disturbances among women of reproductive age, as other studies have indicated that 50% of women with menstrual disorders exhibit increased levels of prolactin, suggesting a similar pattern of prevalence [15].

In Middle Eastern societies, the study on hormonal disorders remains comparatively limited; yet the available data support and some align with our findings. Studies in Saudi Arabia and Egypt observed that 37–40% of women with infertility suffer from hyperprolactinemia [16,17].

Studies indicated that there is a remarkable pattern in the distribution of prolactin levels depending on occupation, although it may seem contradictory at first glance because of overlapping percentages which reflect the variations in subgroup proportions. Generally, these results highlight noticeable differences in prolactin levels depending on occupational status.

In general, it can be said that Hyperprolactinemia is reason from physical, psychological, and emotional stress among non-working women. These factors lead to suppression of dopamine inhibition on the lactotroph cells of the pituitary gland.

In traditional societies, housewives predominantly suffer from chronic stress due to limited social interaction, economic burdens, disrupted sleep patterns, and disorganised household responsibilities [18]. These factors could activate the hypothalamic-pituitary-adrenal [HPA] axis, contributing to elevated levels of prolactin through stress-related pathways.

On the other hand, greater social interaction, a more structured daily routine, and positive psychological stimulation, as well as better access to healthcare and health information among working women, may help reduce mood disorders and chronic stress. This, in turn, supports mental well-being and contributes to a more balanced prolactin level, according to recent studies [19].

A Pearson correlation indicated several statistically significant correlations ($p < 0.01$) between key demographic and physiological variables.

The correlations identified in this study could be deemed axiomatic and compatible with reproductive

patterns correlated with age, number of children and duration of marriage. Older women are more likely to have been married for longer periods and to have had children, especially in Middle Eastern societies, where fertility rates are comparatively high and early marriage is common [20].

In addition, regarding prolactin levels and reduced sleep, an inverse correlation was observed. Although the hypothesis that sleep deprivation contributes to hormonal imbalance is weak, numerous studies found that sleep disturbances can activate the hypothalamic-pituitary-adrenal (HPA) axis [21]. which is led to increase the levels of cortisol and stimulates prolactin secretion through stress-related pathways.

Studies have proposed that poor sleep correlates with increased levels of prolactin, which may be due to disrupted dopamine regulation [22]. Others have indicated that chronic insomnia is common among women who juggle household responsibilities and childcare, which may lead to increased psychological stress that negatively affects the levels of prolactin [23].

In the same context, the reverse correlation between the levels of prolactin and number of children also applies. Women with few children could be more likely to have higher levels of prolactin, possibly because of undiagnosed clinical infertility, menstrual irregularities, or anovulation. This is consistent with other studies that have suggested women with hyperprolactinemia tend to have lower birth rates and are also at increased risk of secondary infertility.

CONCLUSION

The study revealed a remarkable prevalence of abnormal prolactin results in married females who visited Al-Batool Teaching Hospital, with a predominance of hyperprolactinemia. Prolactin levels had significant associations with marriage length, number of children, and average sleep per night. A longer period of marriage and a lower number of children were seen to be associated with higher levels of hyperprolactinemia, and a weak negative correlation was noted between the prolactin levels and the sleep duration.

Recommendation

It is essential to increase health awareness about prolactin disorders and educate the community on their impact on reproductive health, especially among non-working married women. Emphasis should be placed on encouraging women's communities to reduce psychological and physical stress and focus on improving sleep quality.

Author Contributions

Reem A. Mansour and Mustafa Abdulkareem Salman conceived and performed the experiments and contributed to the analysis. Mustafa Abdulkareem Salman, Aseel Fadhil Mahmood, Mohammed Shihab Ahmed, and Reem A. Mansour were involved in processing experimental data, performing the analysis, and drafting the manuscript. Furthermore, aided in interpreting the results. All the authors provided critical feedback and helped shape the research, analysis, and manuscript.

Funding

This research did not receive a specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Declarations

Conflict of interest: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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