

# Assessment of awareness about contraception among a sample of Iraqi women using hormonal contraceptives: a cross-sectional study

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## Abstract

Non-adherence to hormonal contraceptives is often due to lack of information, fear of adverse effects, and social and religious stigmas. The aim is to assess the women's awareness and adherence to hormonal contraceptives among women of childbearing age and also to track the adverse effects of hormonal contraception. A cross-sectional, community-based study involved 80 women who were assessed for the level of women's awareness and adherence using a validated Arabic questionnaire. Women had moderate levels of knowledge about hormonal contraceptives (46.25%), a neutral attitude level constituted the majority of women's responses (52.5%), and a good practice level (53.75%). Most of the women (68.75%) had good adherence levels. Higher levels of non-adherence were associated with mood swings (84%) and depression (84%). There was a strong direct correlation between awareness score and higher adherence score. Regarding the education levels of wives, there was a direct significant correlation between awareness scores and higher adherence scores. In conclusion, the women had moderate knowledge, neutral attitudes, and good practices about contraception, mainly due to university education. Adherence to hormonal contraceptives was positively associated with good awareness.

## Keywords

contraception, hormonal, scores, correlation

## Introduction

Contraception is one of the primary focuses of medical practice as pregnancy prevention. It is an intervention that decreases the likelihood of becoming pregnant (Daidone et al. 2024). Contraception use is reported by approximately 88% of women who do not intend to become pregnant (Festin et al. 2020). Access to efficient contraception is crucial for women and overall welfare; hence, family planning not only eliminates health risks for women but also reduc-

es infant mortality, lowers the occurrence of abortion, and slows down population increases (Zendehdel et al. 2020). Furthermore, some forms of specific contraception may reduce the spread of human immunodeficiency virus and other sexually transmitted diseases (Salad et al. 2023).

In developing countries, the use of modern contraceptives has increased dramatically, and family size has sharply decreased throughout the last 50 years. From an estimated average of 5 to 2.5, family size globally decreased by half between 1950–1955 and 2005–2010 (Alizzi et al.

2018; Teal and Edelman 2021). The average fertility rate remains greater in developing countries than in industrialized ones, but the decline is more pronounced in emerging nations. Consequently, the disparity in the average number of children per woman across these nations has decreased from 4 children to one child. Fertility rates significantly declined in Eastern Asia, whereas they continue to be high in Sub-Saharan Africa (Mohammed et al. 2018; Al-Mousawi et al. 2020; Teal and Edelman 2021).

Pharmacists are medical professionals who help patients choose the best medication for their patients (Jumaah Jebur et al. 2018; Fadhil et al. 2023; Ibrahim et al. 2023; Beshna et al. 2024; Daidone et al. 2024). The foundation of contraception is the couple's knowledge, attitudes, and sound judgment (Aly et al. 2022). It assists couples in determining the number and size of their ideal family and offspring. Several factors that influence the use of contraception include the age at which individuals marry, the frequency of sexual intercourse, the degree of education, efficient communication between couples, the availability of accurate information about contraception, financial considerations, and convenient access to medical services (Zendehdel et al. 2020). Family planning provides advantages such as regulating the timing between children, managing economic limitations, and enhancing the mother's and child's well-being, resulting in overall enhancements to living standards (Alomair 2022).

The use of contraceptive methods may efficiently prevent unwanted pregnancy. The difference in efficacy between perfect usage and normal use of hormonal contraceptives is due to the significant rates of non-adherence and discontinuation (Burke et al. 2021). This study aims to assess women's awareness and adherence to hormonal contraceptives among women of childbearing age. Furthermore, to track the adverse effects of hormonal contraception.

## Methods

### Study design and settings

The current study was a cross-sectional community-based study conducted from 1 October 2023 to 31 March 2024. It included a sample of 80 married women who received hormonal contraceptives during their visit to the family planning division at Al-Yarmouk Teaching Hospital in Baghdad, Iraq.

### Inclusion criteria

Healthy married women, women of reproductive age (18–49 years), regular use of hormonal contraceptives for at least six months, and regular menstruation before and during hormonal contraceptives (Cho et al. 2014).

### Exclusion criteria

Women with obstetric or gynecological disorders (irregular menstrual bleeding, bilateral oophorectomy, menorrhagia, polycystic ovarian syndrome, and premature ovarian

failure) (Cho et al. 2014), women with hormone-sensitive tumors, women with pituitary and adrenal disorders that affect hormone levels, women on other contraceptive methods, since they do not affect ovarian reserve, and women on other medications and supplements that alter sex hormone levels.

### Data collection

Data was collected by the researcher using a validated Arabic version or Arabic-translated questionnaire, and its validity was examined in a pilot study. Data was collected from women through direct face-to-face interviews. Data on women's demographics and disease characteristics was collected.

### Pilot study

A pilot study lasted for two weeks and was conducted randomly by the researcher at Al Yarmouk Teaching Hospital. The authors selected ten married women who were not included in the study. The face validation was done to fulfill the requirements for study enrollment, ensure that the translated questionnaire was clear, and determine whether any adjustments should be made related to the subjective instruments of the study. The necessary adjustments were implemented to assess the suitability and significance of the research instruments and the clarity of the questionnaire design.

### Reliability test

Using Cronbach's alpha to assess reliability, the translated questionnaire about women's awareness of hormonal contraception (KAP) was (0.784). The validated adherence questionnaire (MARS) was (0.795), indicating good internal consistency for all study instruments, according to the following scale: (alpha level:  $\geq 0.9$  indicates excellent reliability (high-stakes testing), 0.7 to 0.89 indicates good reliability (low-stakes testing), 0.6 to 0.69 indicates acceptable reliability, 0.5 to 0.59 indicates poor reliability, and  $< 0.5$  indicates unacceptable reliability) (Lincoln et al. 2021).

### Assessment of participant awareness of hormonal contraception

Participants were interviewed using a carefully structured questionnaire adapted from relevant studies (Lincoln et al. 2021). Women's awareness was assessed using the knowledge, attitude, and practice (KAP) questionnaire translated into Arabic.

### Knowledge of women regarding hormonal contraception

A modified version of Bloom's cut-off points was used during the assessment. A score of 80–100% indicated a good level of knowledge, 50–79% indicated a moderate

level of knowledge, and a score below 50% indicated a poor level of knowledge. Modified Bloom cut-off points were adopted from John's knowledge, attitude, and practice study.

The scores were categorized into three knowledge levels: 0–11 as "Poor" (low-level) knowledge, 12–18 as "Moderate" (medium-level) knowledge, and 19–24 as "Good" (high-level) knowledge. The answers were reversed in the knowledge questions with numbers 2, 8, and 12 (Table 1).

## Attitude of women regarding hormonal contraception

Regarding attitude-related questions, the participants' attitudes were evaluated using a Likert scale consisting of 15 questions. The Likert scale questions encompassed a range of responses, varying from high-level to low-level.

For instance, a rating of 5 indicated "Strongly Agree," while a rating of 4 denoted "Agree," 3 represented "Neutral," 2 indicated "Disagree," and 1 signified "Strongly Disagree".

The respondents' total score ranges from a minimum of 15 to a maximum of 75. Attitudes with combined scores below 35 were classified as "negative level", scores between 35 and 56 were classified as "neutral level", and scores 57 and above were classified as "positive level" (Lincoln et al. 2021).

Practice of women regarding hormonal contraception

A score of 7–15 indicates poor (low-level) practice, a score of 16–24 indicates moderate (medium-level) practice, and a score of 25–35 indicates good (high-level) practice, as seen in Table 2. The highest possible score is 35, while the lowest is 7.

## Assessment of adherence to hormonal contraceptives

The evaluation of adherence to hormonal contraceptives was conducted using the oral contraceptive pill-specific Medication Adherence Report Scale (MARS) Arabic version. Each item will be rated on a 5-point scale, with 1 representing "always," 2 representing "often," 3 representing "sometimes," 4 representing "rarely," and 5 representing "never" (Molloy et al. 2012; Hamid et al. 2018); see Table 3.

**Table 1.** Statements in the knowledge section.

Q	Questions on the knowledge	Yes	No	Don't know
1	Have you ever heard of contraceptives?	Yes -2; Uncertainty -1; Incorrect response - 0		
2	Birth control pills are effective even if a woman misses taking them for two or three days in a row.	Yes -2; Uncertainty -1; Incorrect response - 0		
3	Female sterilization is one way to avoid pregnancy.	Yes -2; Uncertainty -1; Incorrect response - 0		
4	Health education is important for women who want to use contraception.	Yes -2; Uncertainty -1; Incorrect response - 0		
5	Contraceptive pills do not guarantee 100% protection.	Yes -2; Uncertainty -1; Incorrect response - 0		
6	Condoms prevent sexually transmitted diseases.	Yes -2; Uncertainty -1; Incorrect response - 0		
7	Common side effects of contraceptive pills include mood swings and weight gain.	Yes -2; Uncertainty -1; Incorrect response - 0		
8	There is an increased risk of breast cancer in women taking estrogen-containing contraceptives.	Yes -2; Uncertainty -1; Incorrect response - 0		
9	Women using the birth control shot must get an injection every three months.	Yes -2; Uncertainty -1; Incorrect response - 0		
10	If a woman is having side effects of one kind of contraceptive pill, switching to another type might help.	Yes -2; Uncertainty -1; Incorrect response - 0		
11	Using both a condom and a pill is considered to be a very effective contraceptive.	Yes -2; Uncertainty -1; Incorrect response - 0		
12	Using the pill increases a woman's risk of ovarian, endometrial, or cervical cancer.	Yes -2; Uncertainty -1; Incorrect response - 0		

**Table 2.** Statements in the practice section.

Q	Questions on practice	Never	Seldom	Sometimes	Usually	Always
1	How many times a year do you visit a health center for family planning services?	Never-1; Seldom - 2; Sometimes -3; Usually -4; Always - 5				
2	Do you use contraceptives to prevent unplanned pregnancy?	Never-1; Seldom - 2; Sometimes -3; Usually -4; Always - 5				
3	Have you ever had any unplanned pregnancies due to a lack of contraceptive use?	Never-1; Seldom - 2; Sometimes -3; Usually -4; Always - 5				
4	Do you use contraceptives every time when you do not intend to get pregnant?	Never-1; Seldom - 2; Sometimes -3; Usually -4; Always - 5				
5	I use different types of contraceptives.	Never-1; Seldom - 2; Sometimes -3; Usually -4; Always - 5				
6	My current method of contraception changes from time to time.	Never-1; Seldom - 2; Sometimes -3; Usually -4; Always - 5				
7	Do you practice any traditional contraceptive methods, including withdrawal, infertility period, herbal, and breastfeeding if you were not using any contraceptives?	Never-1; Seldom - 2; Sometimes -3; Usually -4; Always - 5				

**Table 3.** Statements of adherence to hormonal contraceptives.

Q	Adherence Related Questions	Always	Often	Sometimes	Rarely	Never
1	I forget to take my oral contraceptive pill	Always - 1, often - 2, sometimes - 3, rarely - 4, always - 5				
2	I alter the dose of my oral contraceptive pill	Always - 1, often - 2, sometimes - 3, rarely - 4, always - 5				
3	I stop taking my oral contraceptive pill for a while when I am not supposed to	Always - 1, often - 2, sometimes - 3, rarely - 4, always - 5				
4	I decided to miss out on a dose of my oral contraceptive pill	Always - 1, often - 2, sometimes - 3, rarely - 4, always - 5				
5	I take less than instructed.	Always - 1, often - 2, sometimes - 3, rarely - 4, always - 5				

The final total score varied from 5 to 25 points, with higher scores representing better adherence. Patients with scores of  $\geq 23$  were classified as adherent, while those  $< 23$  were classified as non-adherent (Stone et al. 2021).

## Assessment of adverse effects of hormonal contraceptives

The assessment of adverse effects resulting from the use of hormonal contraceptives was collected through a questionnaire designed as in a previous study (Aldabbagh and Al-Qazaz 2020; Stone et al. 2021). Participants were asked about the specific hormonal contraceptive they were using when experiencing adverse effects.

## Ethical approval

The Research Ethical Committee approved the study at the College of Pharmacy, Mustansiriyah University (approval number: 45, reference number: 124, approval date: 1 September 2023). Written informed consent was obtained from all women.

## Sample size calculations

It was determined using the G\*Power version (3.1.9.7) (Faul et al. 2007; Faul et al. 2009) using the binominal test; the effect size was 0.2,  $\alpha$ -level 0.05 (two-tailed),  $\beta$ -level 0.05 (power 95%), and the total sample size was 80.

## Statistical analysis

Linear correlation assesses the relationship between knowledge, attitude, practice, and adherence to socio-demographic factors. In contrast, the chi-square test or Fisher exact assesses the association between adverse effects and adherence levels (Ghent 1972). All analyses were carried out by GraphPad Prism version 10.3.0 for Windows. Probability values less than 0.05 were statistically significant.

## Results

### Sociodemographic characteristics and description of hormonal contraceptives

Regarding the sociodemographic characteristics of the participants, the mean age of women was  $30.5 \pm 3.3$  years, with 48.8% of the women aged between 26–30 years, 45% aged more than 30 years, and 65% of the women having an urban residence. The education level of the husband: no formal education, primary school, secondary school, university level, and above in around 20%, 27.5%, 23.8%, and 28.7%, respectively, while the education level of the women: no formal education, primary school, secondary school, and university level and above in around 18.8%, 22.5%, 23.8%, and 35.0%, respectively. Around 60% of the women were housewives,

and 40% were workers. Regarding economic status, 32.5% had a monthly income of  $< 500,000$  Iraqi dinars (ID), 53.8% had a monthly income between 500,000 and 1,000,000 ID, and 13.8% had an income  $> 1,000,000$  ID. Regarding the number of children, 3.8% are without children, 48.8% have 1–2 children, 30.0% have between 3 to 4 children, and 17.5% have  $\geq$  five children. All women had regular menstrual periods before the start of hormonal contraceptives.

The most currently used hormonal contraceptives were 66.3% combined oral contraceptives (COCs) and 33.7% injectable contraceptives. Regarding the ethinyl estradiol dose in the COC, 90.6% ( $n = 48$ ) used 30–35  $\mu\text{g}$ , and 9.4% ( $n = 5$ ) used 20  $\mu\text{g}$ . Regarding the generation of progestins, 93.8% used the second generation, and 6.3% used the third generation. Regarding the duration of contraceptive use, 13.8% used contraceptives for 6–12 months, 27.5% used contraceptives for 1–2 years, and 58.8% used contraceptives for more than two years. Around 17.5% had a failure during contraceptive use in the last year, as seen in Table 4.

**Table 4.** Assessment of sociodemographic variables.

Variables	Value
Age groups (in years)	18–25 years 5 6.3%
	26–30 years 39 48.8%
	>30 years 36 45.0%
Residence	Urban 52 65.0%
	Rural 28 35.0%
The education level of the husband	No formal education 16 20.0%
	Primary school 22 27.5%
	Secondary school 19 23.8%
	University and above 23 28.7%
The education level of the wife	No formal education 15 18.8%
	Primary school 18 22.5%
	Secondary school 19 23.8%
	University and above 28 35.0%
Occupation of the wife	Housewife 48 60.0%
	Worker 32 40.0%
The economic status of the family	$< 500000$ IQD 26 32.5%
	500000-1000000 IQD 43 53.8%
	$>1000000$ IQD 11 13.8%
Number of children	None 3 3.8%
	1–2 39 48.8%
	2–4 24 30.0%
	5 and more 14 17.5%
Description of hormonal contraceptive	
Type of currently used hormonal contraceptive	Combined Oral Contraceptives COC 53 66.3%
	birth control injection 27 33.7%
Ethinyl Estradiol dose in the COC ( $\mu\text{g}$ )	20 $\mu\text{g}$ 5 6.3%
	30–35 $\mu\text{g}$ 51 63.8%
Generation of injection Progestogens	Second 75 93.8%
	Third 5 6.3%
Duration of contraceptive use retrospectively	6–12 months 11 13.8%
	1–2 years 22 27.5%
	>2 years 47 58.8%
Failure during contraceptive use in the last year	Yes 14 17.5%
	No 66 82.5%
Regular menstrual period before the start of hormonal contraceptive	Yes 80 100.0%
	No 0 0.0%

### Assessment of adverse effects of hormonal contraceptives

Data from the 80 women who received hormonal contraceptives regarding the adverse effects of hormonal contraceptives are presented in Fig. 1, where most of the women suffered primarily from mood swings (68.8%) and depression (68.8%), followed by headache in (60%) and anxiety in (58.8%) of women.

### Assessment of women's knowledge, attitude, and practice

#### Assessment of women's knowledge

The knowledge questionnaire presented in Fig. 2 showed women's responses to knowledge about hormonal contraceptives. The majority of women (93.8%) provided correct responses to the knowledge statements about identifying

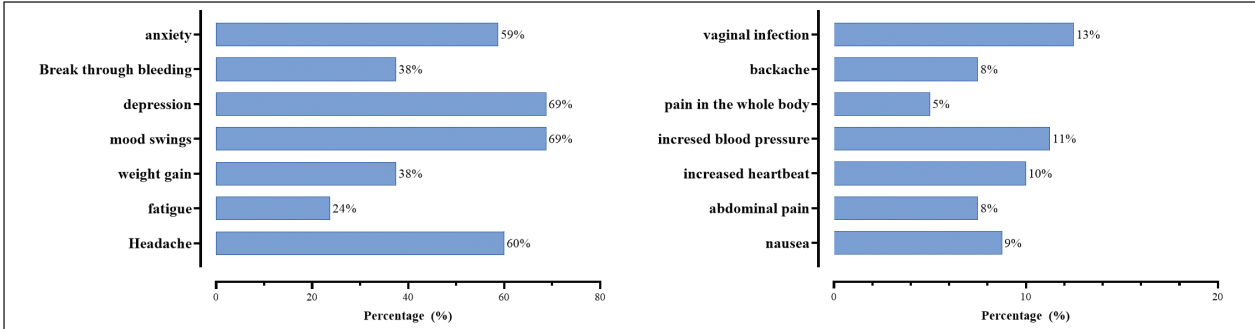


Figure 1. Adverse effects of hormonal contraceptive drugs.

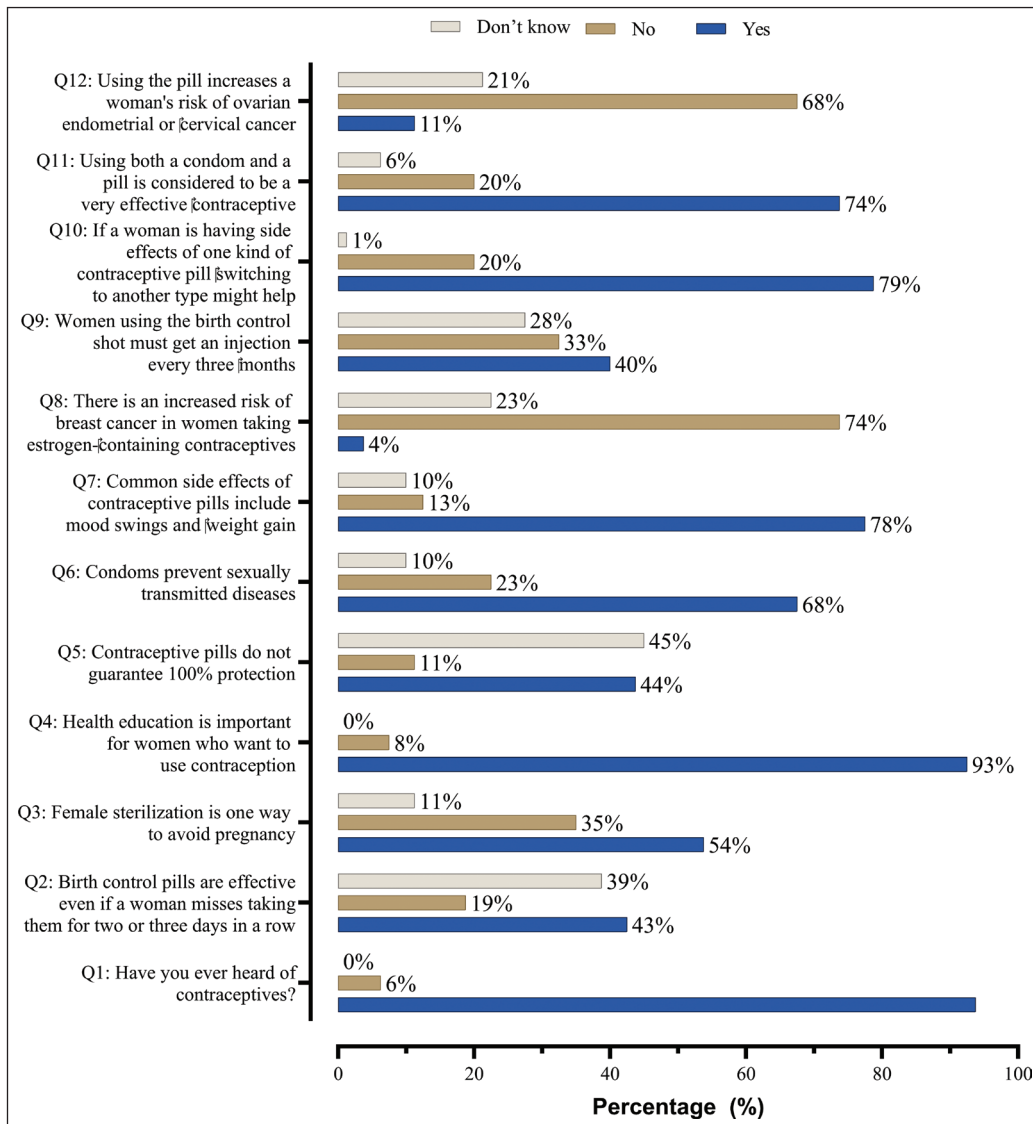


Figure 2. Response to knowledge questions.



hormonal contraceptives and 92.5% about female sterilization. Fair responses about common side effects of contraceptive pills and switching to another type might help (77.5% and 78.8%, respectively).

**Assessment of women’s attitude**

The questionnaire presented in Fig. 3 showed women’s responses to attitudes about hormonal contraceptives. The majority of women provided accepted responses to the attitude statements about how spacing helps kids stay healthy (62.5%), contraceptives extend the childbearing intervals (56.3%), and contraception protects family and community health (50%).

**Assessment of women’s practice**

The questionnaire presented in Fig. 4 showed women’s responses to the practice questionnaire about hormonal contraceptives. The majority of women presented with good practices about traditional contraceptives, including visiting a health center for family planning services (27.5%), using contraceptives to prevent unplanned pregnancy (33.8%), changes in the contraceptive method (36.3%), using contraception always when you don’t want to get pregnant (35%), and practicing any other traditional contraceptive methods (38.8%).

Fig. 5A demonstrates the distribution of study groups according to the level of knowledge. The predominant level of knowledge was moderate (46.25%), followed by a good level of knowledge (37.5%).

Regarding the distribution of study groups according to the level of attitude, Fig. 5B shows that a neutral atti-

tude level constituted the majority of women’s responses (52.5%), followed by a positive attitude level, which constituted (31.5%) of women’s responses.

Regarding the distribution of study groups according to the level of practice, Fig. 5C shows that a good practice level formed the largest percentage of participants (53.75%), followed by a moderate practice level (28.75%).

**Assessment of adherence to hormonal contraceptives**

Data from the 80 women who received hormonal contraceptives-specific MARS are shown in Fig. 6. The majority of women responded (never) in the adherence statements about forgetting to take oral contraceptives (63.7%) and dose changes (68.8%) of the most responses. Regarding the distribution of study groups according to the level of adherence, most of the women (68.75%) had good adherent levels.

**Correlation between knowledge, attitude, practice, and adherence with sociodemographic factors**

There was a strong direct correlation between knowledge score, attitude score, practice score, and higher adherence score. Regarding the education levels of the husband, there was a direct significant correlation with knowledge score, attitude score, practice score, and higher adherence score; similar results were seen with the women’s education levels. Worker women were directly correlated with knowledge score, attitude score, practice score, and higher adherence score.

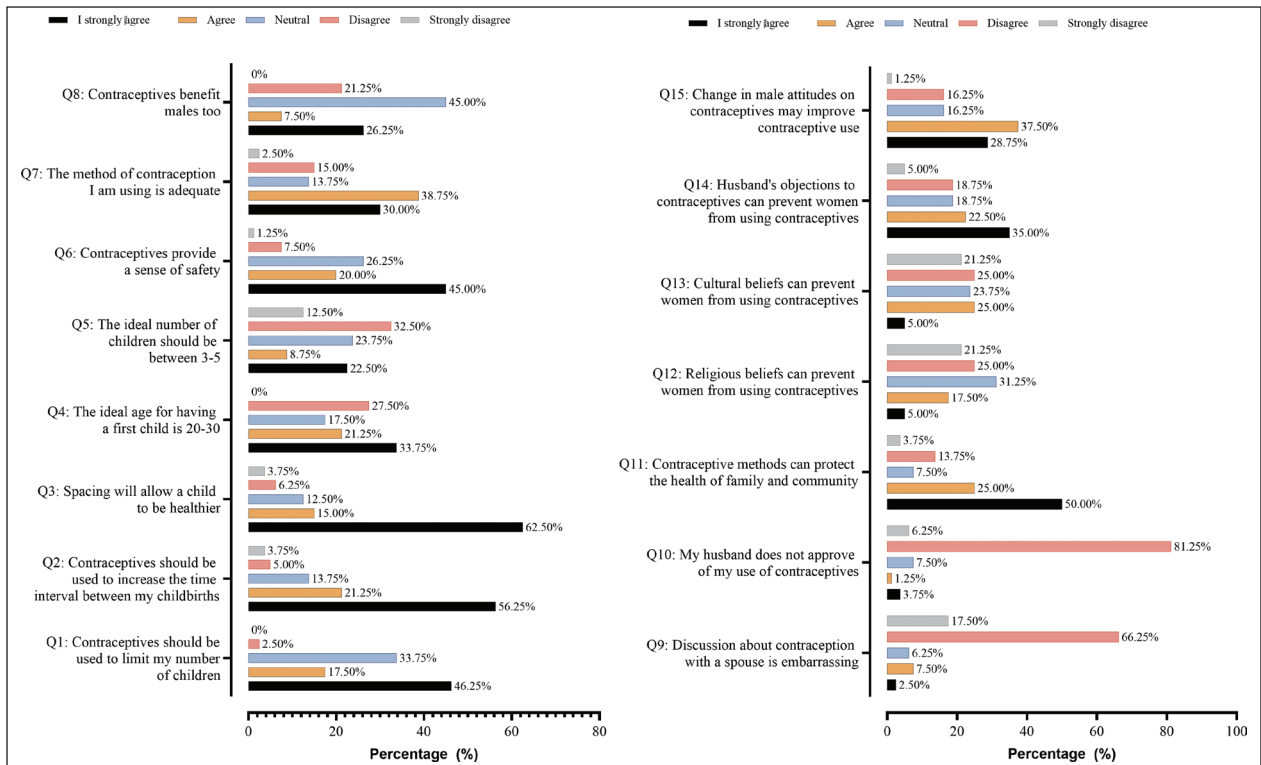


Figure 3. Response to attitude questions.

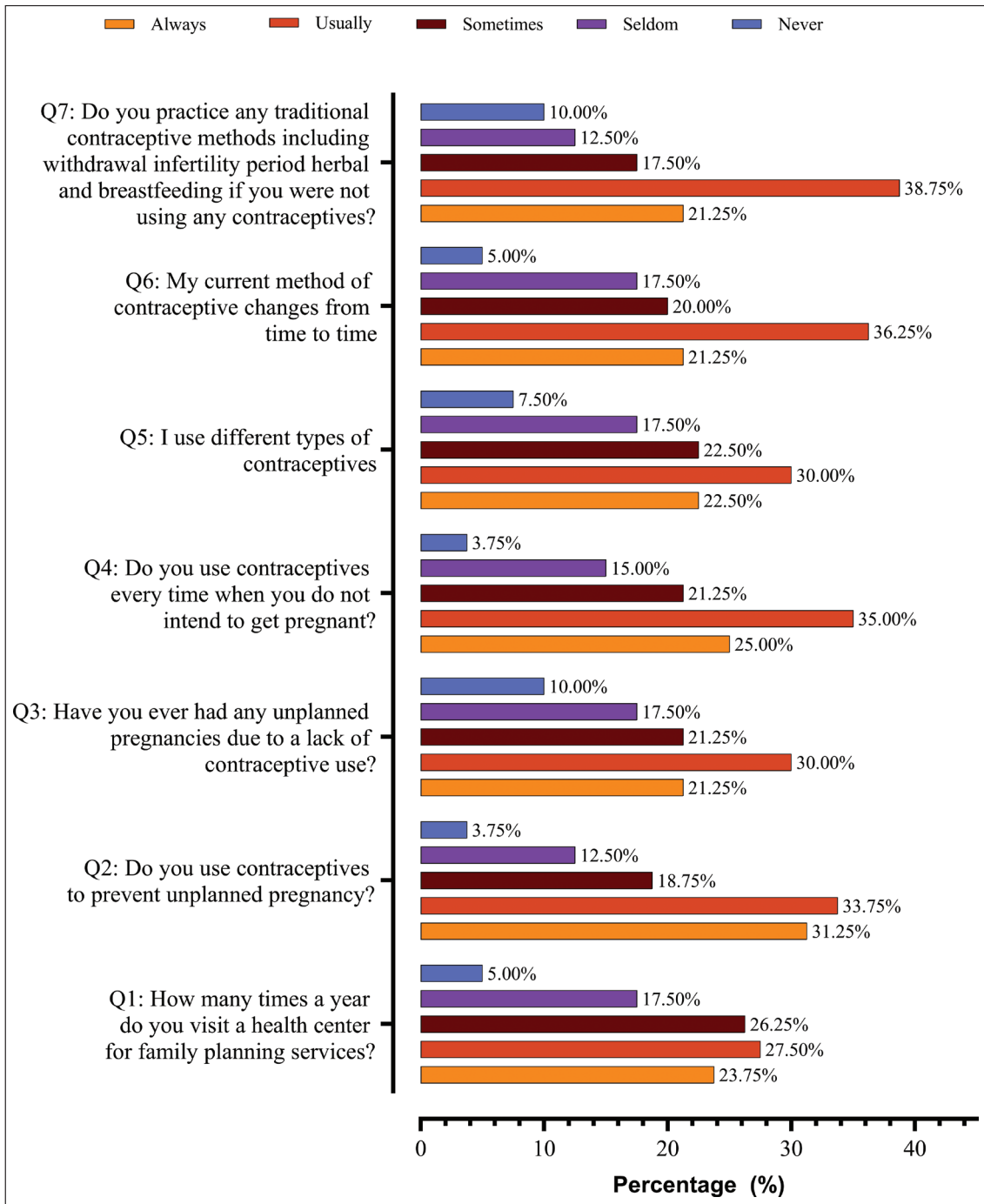


Figure 4. Response to practice questions.

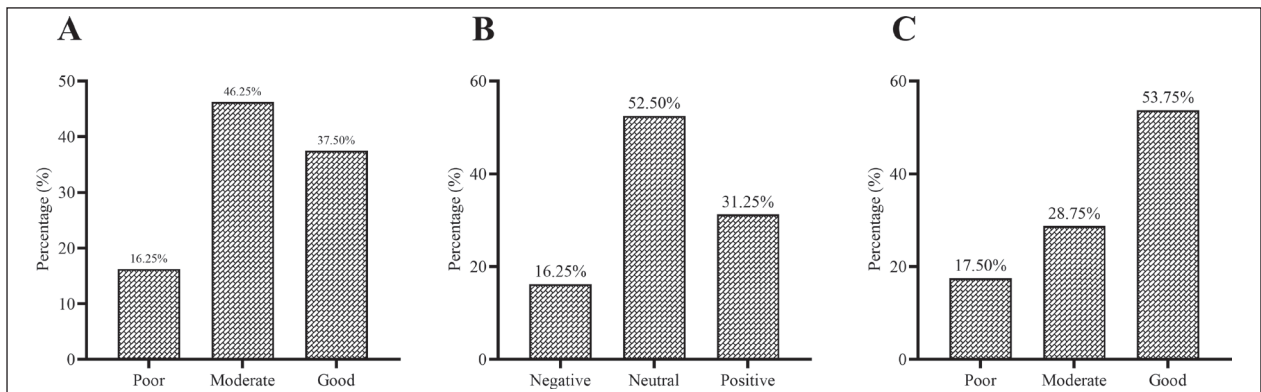
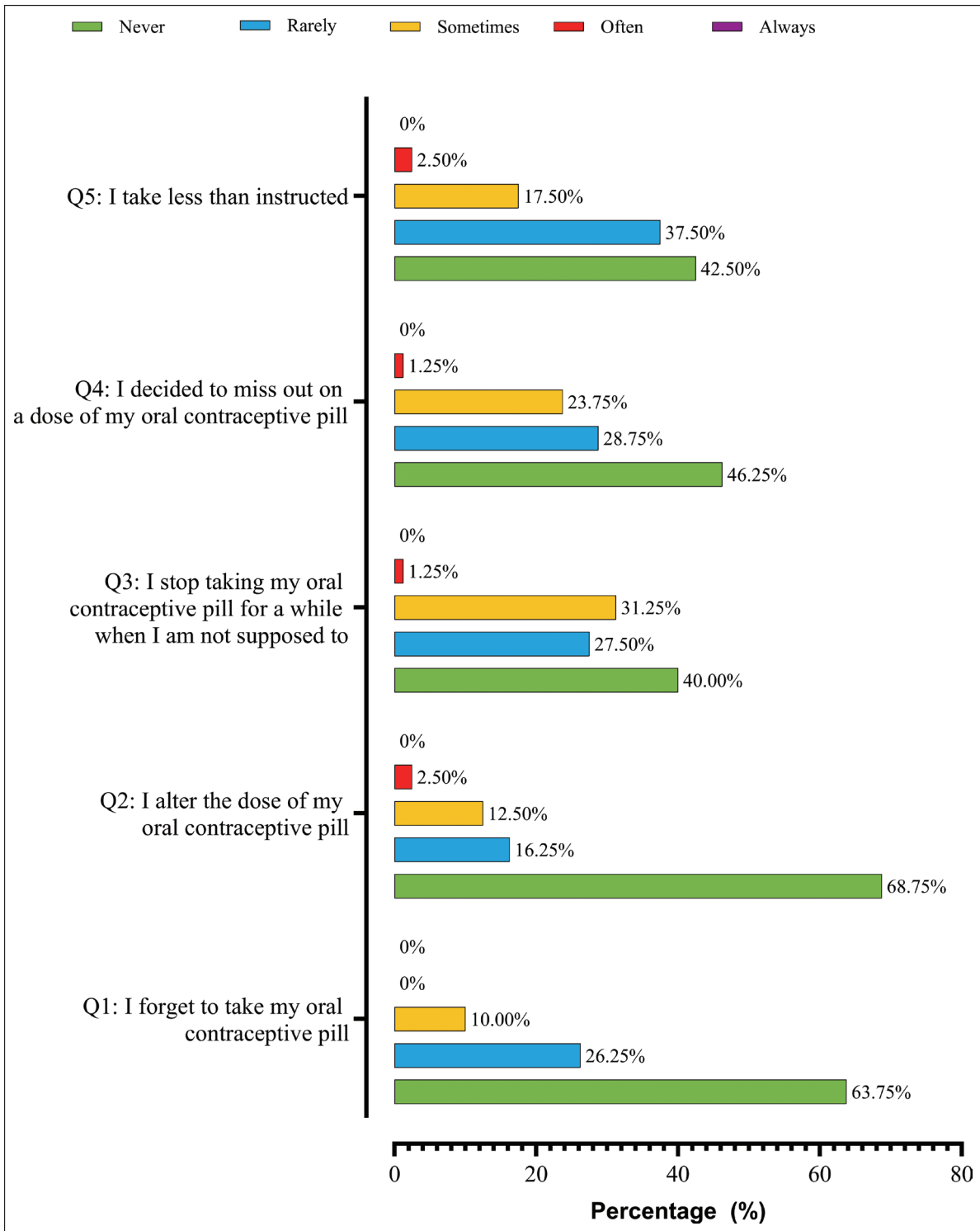


Figure 5. Assessment of awareness about contraception: A. Knowledge; B. Attitude, and C. Practice.



**Figure 6.** Response to adherence questions.

There was an inverse significant correlation between practice score and economic status, as seen in Fig. 7.

### Association between adherence level and adverse effects of contraceptives

In Fig. 8, higher levels of non-adherence were associated with mood swings (84%), depression (84%), and abdominal pain (20%). There was no statistically significant asso-

ciation between adherence levels and other adverse effects of contraceptives.

## Discussion

In the present study, most of the women were middle-aged housewives between 26 and 30 years of age. Another investigation in Iraq revealed that over fifty percent (55%)



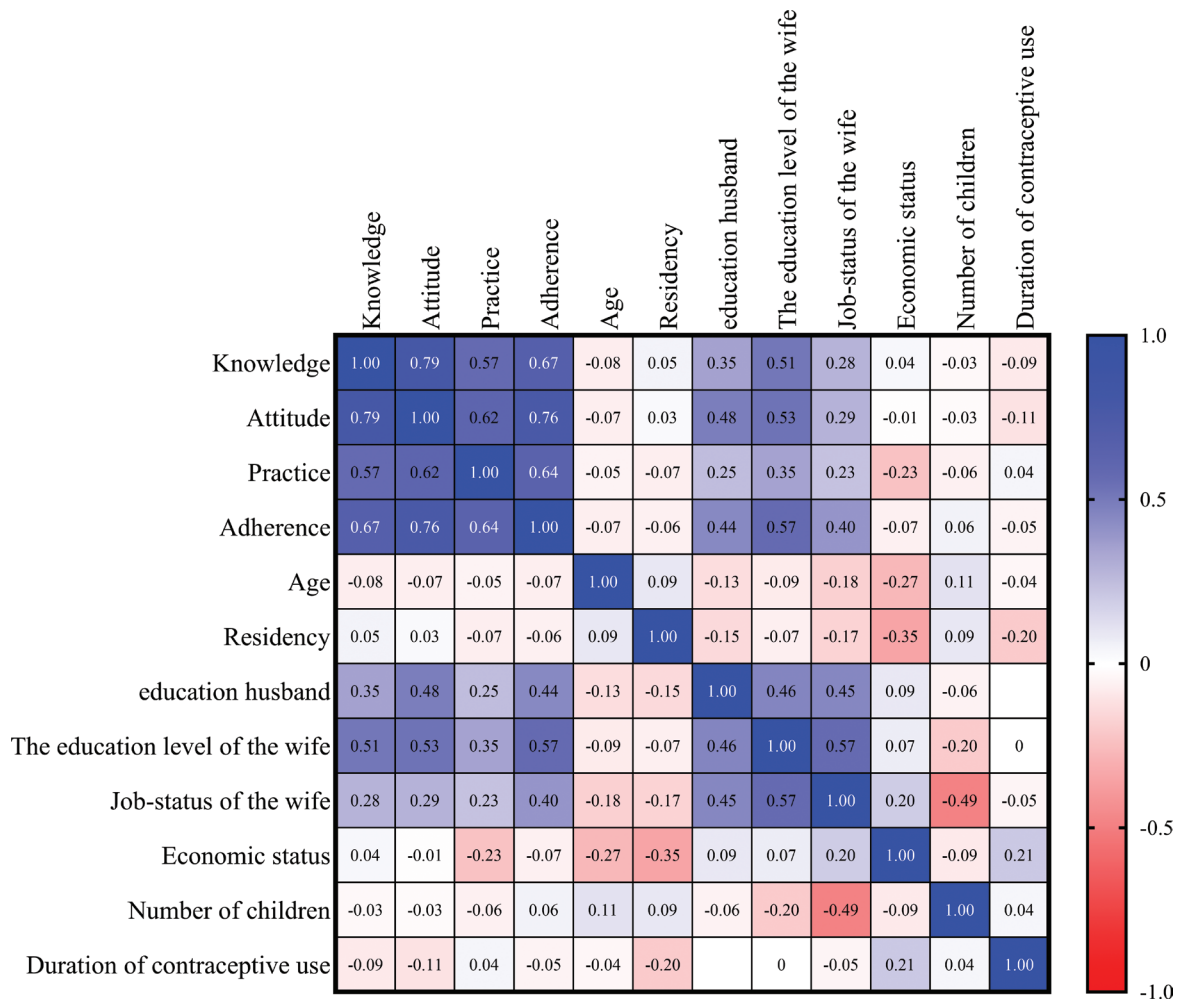


Figure 7. Correlation matrix of knowledge, attitude, practice, and adherence with sociodemographic factors.

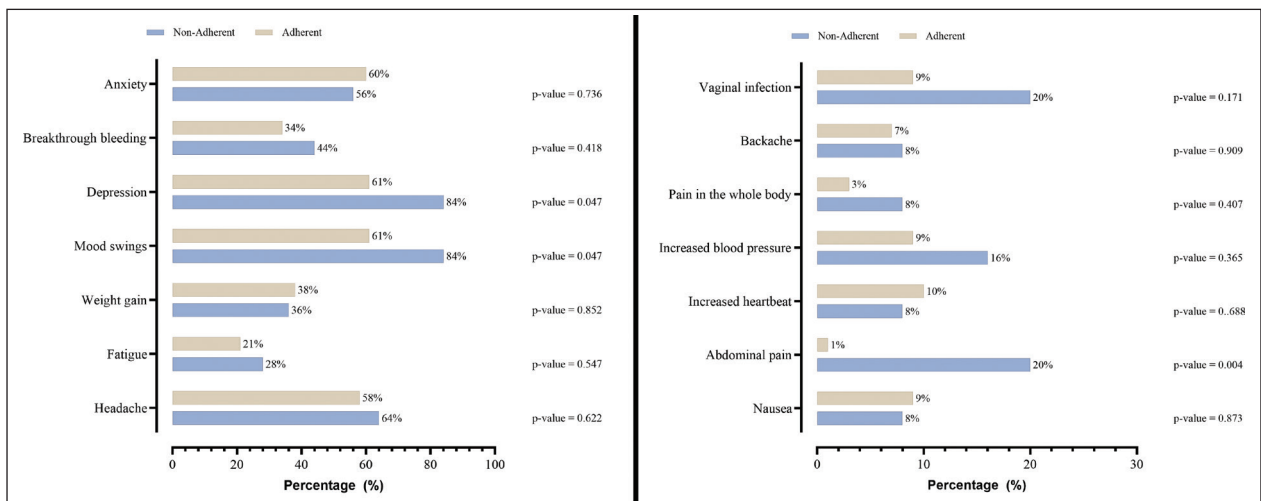


Figure 8. Association between adherence level and adverse effects of contraceptives.

of the women surveyed fall within the age bracket of 26–35 years (Saied 2021). In the current study, most women were of university level or higher. A previous study reported that educated women had higher knowledge of contraceptive methods, leading to greater use compared to less educated women (Pandey et al. 2014). Most of the women in the present study live in urban areas. A recent previous study

estimated that 32.6% of urban women used contraceptives, while only 7.41% of rural women used contraceptives. Urban women were more likely to have access to, know about, and use contraceptives than their rural counterparts (Nakibuuka 2023). Women of higher socioeconomic status, as measured by education and social class relative to women of lower socioeconomic status, were more likely to use modern

contraceptives due to increased awareness, knowledge, and decision-making power regarding their reproductive health, as reported in previous findings in 2023 (Makumbi et al. 2023). Most women with 1–2 children use contraceptives to limit births and space pregnancies, as they are aware of the need for smaller families (Devaru et al. 2020); this was in line with women in the current study.

In the current study, most women use combined oral contraceptives for their ease of use, reversibility of fertility, wide access, safety, and high effectiveness, as stated in a previous study for the preference of combined oral contraceptives (Kilińska et al. 2014). In contrast, other recent findings in 2023 in Iraq showed that withdrawal was the primary contraception choice among a large portion of women, suggesting possible cultural or educational influences favoring non-hormonal and non-medical methods (Alias Alsanity and Younus Hasan 2023).

Most women in this study use hormonal contraceptives for more than two years. They are highly effective in preventing pregnancy when used correctly, and they provide a convenient and reversible method of contraception; most women had a small failure percentage in the last year, as reported in a previous similar study where the failure rate of contraceptives has decreased in recent years (Manlove et al. 2016). Users of hormonal contraceptives in the current study reported adverse effects, mostly presented as mood swings, depression, and anxiety. Those adverse effects of oral contraceptive pills were the cause of 33% of medication withdrawal among women after six months of starting in the US (Sanders et al. 2001).

The study found that most women had moderate to good knowledge of various hormonal contraceptives, with 93.8% of respondents being aware of contraceptive methods. The finding is in line with an Indian study that found 94% of women were aware of the various forms of contraception (Qazi et al. 2019). Conversely, early previous studies conducted in Jordan and Saudi Arabia revealed low levels of knowledge about the use of contraceptives (Al Sheeha 2010; Mahadeen et al. 2012). Meanwhile, a recent study conducted in Thailand in 2024 reported that people's awareness of contraceptive techniques was moderate (Charussangsurinya et al. 2024). Cultural and societal influences also impacted how information on contraception was shared, with diverse contraceptive choices affecting knowledge levels (D'Souza et al. 2022).

The majority of participants had a neutral attitude toward contraception, indicating a mixture of acceptance and uncertainty among women regarding these methods. Good practice levels were demonstrated by the majority of women in the current study. These findings are in line with a previous study enrolling Egyptian women, where the majority of individuals had good attitudes toward contraceptive techniques, with very few expressing negative views (Borg et al. 2022). Additionally, a study on postpartum Nigerian women found that 64.8% of them had a favorable attitude toward contraception (Okafor et al. 2022). In India, 80% of women showed a positive attitude regarding contraception, and 88% of them were

aware of its techniques; however, only 38% of women were using contraception (Lamba et al. 2019; Qazi et al. 2019). Culturally, Middle Eastern societies and other developing countries had for a long time held negative perceptions towards oral contraceptives, brought about by issues related to inadequate health literacy, lack of knowledge, cultural obstacles, fear of adverse effects, and Middle Eastern healthcare systems (Shah et al. 2007). On the other hand, the previous study conducted in Australia stated that many college students used hormonal contraceptives, which proves that this group of people accepts and uses these methods (Greig et al. 2010).

Healthcare accessibility, health education requirements, and cultural norms were some of the elements that contributed to the differences in women's contraceptive practices (Shaaban Mousa Amer et al. 2019). Contraceptive usage was successful in conjunction with a strong healthcare system and programs educating people about sexual health; yet, the national health programs' lack of adequate awareness about contraception leads to uneven practices (Santiago-Tyler 2019).

The present findings revealed that higher knowledge levels were linked to women's educational achievements. Women with university education showed better understanding. Their occupation as housewives also influenced their knowledge levels; they probably possessed fair time to follow educational programs of family planning. Similar previous results from the Indian study revealed that participants' caste and level of education were strongly correlated with their knowledge (Singh et al. 2023). In 2024, it was recently confirmed that the place of residence and educational attainment correlate positively with knowledge scores (Sheng et al. 2024). The awareness was 100% in a previous study in Saudi Arabia when women had secondary or higher education (Alameer et al. 2022). Additionally, women with longer marriages, more education, particular occupations, and higher incomes are more knowledgeable about contraceptive methods, as stated in other studies (Sherpa et al. 2013). Nevertheless, all findings aligned with the current results regarding the influence of educational level: a previous study in Saudi Arabia found higher attitude levels among housewives (Mahboub et al. 2015), and women aged 20 to 30 were more inclined towards practicing family planning; variables including marital status and parity (number of children) were also associated (Gothwal et al. 2020).

The current study identified some sociodemographic characteristics of enrolled women affecting their level of adherence. Higher education levels and employment status were positively associated with adhering to contraceptives. In agreement, a previous study stated that older age and higher levels of education were linked to better adherence rates; meanwhile, having several prescribed medications, having a lower income, and belonging to an ethnic minority group have a negative impact on medication adherence (Steinkellner et al. 2010). In similar results, a prior study discovered a connection between women of reproductive age's knowledge and their degree

of adherence to taking birth control tablets as prescribed (Manurung and Bakara 2022).

The current study indicates that knowledge, attitude, and practice among women were positively correlated with their adherence to hormonal contraceptives. Women who have good adherence to hormonal contraceptives tend to have better awareness (Harvey et al. 2018), and it is linked to factors that promote excellent adherence, such as recognizing the value of continuous usage, having access to information, and getting help from healthcare professionals (Kousar and Afzal 2016).

The current study revealed that most women had good adherence levels in general; the rest of the non-adherent were mostly associated with mood swings and depression. Other adverse effects of contraceptives did not affect adherence levels to a high extent. Oral contraceptive usage may be discontinued due to mood disturbances, as also reported previously (Lewis et al. 2019). Moreover, a previous study enrolled 166 Egyptian women using hormonal birth control; the findings revealed that 13.9% of the participants experienced various adverse effects, and 11.8% of them experienced complications, mostly like nausea, vomiting, weight gain, and breast tenderness. This Egyptian study highlighted physical side effects; meanwhile, women in the current study experienced psychological side effects; nevertheless, both were associated with some non-adherence, as indicated by 68.0% missing one pill, 18.7% missing 2 to 3 pills, and 13.3% unintentionally using it (Yousif and Mansour 2018).

The mood swings and depression as a result of using contraceptive formulations, whether they are progestin-only or a combination of estrogen and progestin, are probably because these hormones affect the amounts of neurotransmitters, especially serotonin, which is important for mood regulation (Klaus and Cortés 2015). Higher rates of non-adherence to hormonal contraceptives have been linked to the presence of certain mood-related adverse effects (Dibonaventura et al. 2012). Patients who suffer from mood disorders, such as anxiety or depression, were advised to stop using contraceptives, which can result in lower adherence and a higher chance of an unplanned pregnancy (Ross and Kaiser 2016).

There are differences in family planning programs worldwide, and numerous interrelated elements, such as demographic, cultural, economic, and social factors, impact awareness about contraception (Qazi et al. 2019). In the current study, the sample was collected from a single province, the capital of which probably implements better family planning programs accessed by urbanites the most. Hence, awareness and related sociodemographics results may differ from those collected from other national areas with different cultural features. Still, the overall results were in agreement with previous studies.

To increase overall adherence, pharmacists can educate and counsel patients on the appropriate usage, adherence, and possible adverse effects of hormonal contraceptives (Ross and Kaiser 2016; Mobark et al. 2019). It has been demonstrated that pharmacist training programs on pre-

scribing hormonal contraceptives enhance pharmacists' expertise and self-assurance in offering this service, which can enhance patient adherence (Ross and Kaiser 2016; Failla et al. 2022). Additionally, pharmacists can assist in correcting beliefs regarding hormonal contraceptives that may affect adherence and accessibility (Ross and Kaiser 2016; Levin and Berger 2023). Due to their limited generalizability, the results might not broadly apply beyond the studied populations. Conducting research with more diverse and extensive samples is essential to determining how generalizable these findings are.

Researchers noted that objective measures of contraceptive use, such as clinic records, electronic monitoring devices, or biomarkers, would be preferable to relying solely on self-reported data, which can be prone to social desirability bias. The studies also highlighted the need to assess detailed patterns of contraceptive use over time rather than just current use. Larger prospective cohort studies with longer follow-up periods would be needed.

Due to time constraints, the study's duration might not adequately capture long-term trends or practice changes. To assess these aspects, longitudinal multicenter studies that track participants would be required. Study the impact of national family planning programs on adherence to and awareness about contraception. Targeted interventions to improve patients' self-efficacy and understanding of oral contraceptive pills from medical professionals, health educators, and other adherence-related media.

## Conclusion

Most women had moderate knowledge, neutral attitudes, and good practice about contraception, mainly related to their university level of education and housewives. They had good adherence levels, but those with psychological adverse effects had higher non-adherence rates. There was a positive association between adherence to hormonal contraceptives and good awareness.

## Additional information

### Conflict of interest

The authors have declared that no competing interests exist.

### Ethical statements

The authors declared that no clinical trials were used in the present study.

The authors declared that no experiments on humans or human tissues were performed for the present study.

Informed consent from the humans, donors or donors' representatives: The Research Ethical Committee approved the study at the College of Pharmacy, Mustansiriyah University (approval number: 45, reference number: 124, approval date: 1 September 2023). Written informed consent was obtained from all women. The authors declared that no experiments on animals were performed for the present study.

The authors declared that no commercially available immortalised human and animal cell lines were used in the present study.

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## Data availability

All of the data that support the findings of this study are available in the main text.

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