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Dietary patterns, risk factors, and time frames of heart attacks, arrhythmias, and conduction disorders: a cross-sectional study

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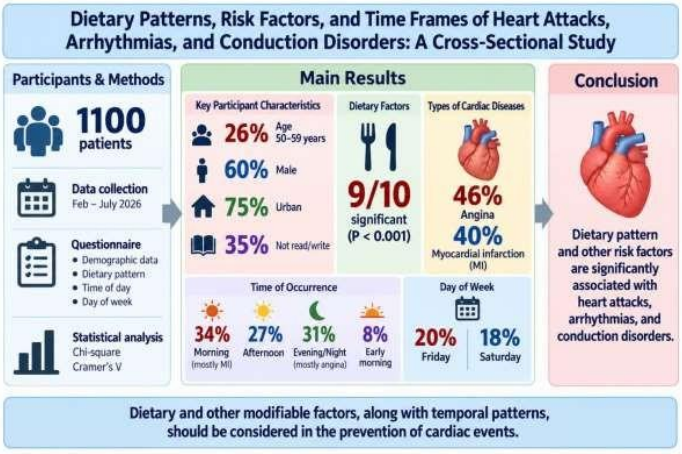
Abstract

Introduction: Cardiovascular diseases (CVDs) represent the leading cause of dying cases globally and embody a major public health obstacle. They involve IHD, heart failure, arrhythmias, and electrical conduction disorders, that contribute basically to hospitalization, morbidity, and mortality. The global burden has been related to people ageing and the increasing prevalence of CVDs risk factors. Approximately 19.8 million deaths were related to CVDs globally during 2022. **Objective:** It was to identify dietary and other risk factors and time frames of heart attacks, arrhythmias, and conduction disorders. **Methods:** A descriptive study were carried out to achieve the objectives of the study. A non-probability convenience sampling method was used to select (1100) patients that diagnosed with cardiac diseases by the medical staff in CCU of both Kirkuk Teaching Hospital and Azadi teaching Hospital in Kirkuk's city and to achieve the objectives of the study. The data were collected for a period from 1 February through 31 Juley 2026 through an interviewer – administered questionnaire in which constructed for the study that consisted of parts I, demographic data (risk factors), part II, dietary pattern of the participants. part III, cardiac diseases occurrence according to the times of day, part IV, cardiac events according to days of week. A content validity was obtained to review the items relativeness of the tool. Reliability of the questionnaire rated (0.81). The data were analyzed by using descriptive and inferential statistical data analysis including (frequencies, percentage, Pearson Chi-square, Cramer's v test, Monte-Carlo test and Chi-Square Goodness-of-Fit Test). **Results**: The findings of the study showed risk factors related demographic data that most of the sample were from age group (50-59) years which represent (26%), male percentage was (60%) compared to female (40%), marred cases accounted (66%), not read/write (35%), lived in urban (75%), housewife represented patients (40%) . Also, the study reported that most of the participants had angina (46%) followed by MI (40%). Furthermore, majority (9 out of 10) of the items were highly significant ($p < 0.001$) in regard to dietary factor. In addition, cardiac diseases and arrhythmia was occurred highly during morning (34%) mostly among MI cases (17%) and evening/night (31%) most of them had angina (19%). 20% take place on Friday and (18%) 0n Saturday. Relationship between cardiac conditions and time of occurrence showed a moderate significant association for both time of day and day of week ($p<0.001$). **Conclusions**: The study concluded that risk factors of cardiac diseases involved individuals with age group (50-59) years old , males, married, unable to read/ write, urban resident and housewives. Furthermore, dietary pattern was highly significant factor for cardiac diseases, arrhythmias and conduction disorders. In addition, cardiac diseases occurred during Sunday and Fridays regarding MI whereas Angina on Saturday, and a clear increase in incidence during morning and evening hours. A moderate significant association was observed between cardiac conditions and time frame according to time (hours) of day and days of week.

Keywords: Dietary patterns. Nutrological factors. Cardiovascular diseases. Arrhythmias. Time frames.

Graphical Abstract



Source: Own authorship.

Introduction

Cardiovascular diseases (CVDs) represent the leading cause of dying cases globally and embody a major public health obstacle. They involve IHD, heart failure, arrhythmias, and electrical conduction disorders, that contribute basically to hospitalization, morbidity, and mortality. The global burden has been related to people ageing and the increasing prevalence of CVDs risk factors. Approximately 19.8 million deaths were related to CVDs globally during 2022, highlighting the significance of determining individuals at high risk and enhancing early prevention and diagnosis **[1]**.

Age and sex in particular are significant predictors of conduction abnormalities, arrhythmias, and cardiovascular disease. Age-related structural and electrical changes in the heart, as well as cumulative exposure to cardiovascular risk factors, are significantly linked to atrial fibrillation and other rhythm disorders. Many reports of sex-related disparities, with men typically acquiring a number of cardiovascular and conduction diseases at younger ages than women. The significance of demographic traits in the development of cardiac conduction illness is demonstrated by recent population-based data showing that male sex and advanced age are separately linked to an increased risk of high-degree atrioventricular block **[2,3]**.

The occurrence and timing of cardiac disease are also influenced by the duration and accumulation of cardiovascular risk factors. Hypertension, diabetes, obesity, smoking, alcohol consumption, physical inactivity, sleep apnea, heart failure, and chronic kidney disease can promote structural and electrical remodeling of the heart and consequently increase susceptibility to arrhythmias and conduction abnormalities. Dietary patterns are important modifiable factors in cardiovascular health. Importantly, these risk factors may act cumulatively over time, meaning that prolonged exposure may influence not only whether disease develops but also the age at which it becomes clinically apparent **[4]**.

Despite considerable advances in cardiovascular epidemiology, an important knowledge gap remains regarding the combined relationship between demographic characteristics, the timing of disease occurrence, arrhythmias, and conduction disorders. Existing studies have frequently focused on individual conditions, particularly atrial fibrillation, or on selected clinical risk factors, while less attention has been given to how demographic characteristics may influence the occurrence and timing of different cardiac rhythm and conduction disorders within the same population. Recent evidence also demonstrates substantial differences in the burden of rhythm and conduction disorders according to demographic and socioeconomic characteristics, emphasizing the need for population-specific epidemiological research **[5]**.

CVDs are at the forefront of global causes of death; the number of deaths from these diseases is higher than deaths from any other cause of death. Therefore, the present study aims to identify risk factors related to demographic characteristics and identify associations between time in day /night and disease occurrences. Time frames of ischemic heart disease and cardiac arrhythmias are unstudied and lack statistics; the need for a cross-sectional study assessing the time frames of cardiac abnormality is considered necessary in Kirkuk city.

Method and subject

Prior to data collection, formal administrative approval was obtained to conduct the study from Kirkuk heath directorate. A quantitative design (descriptive study) was conducted, according to STROBE guidelines, on patients who were hospitalized in coronary care unit (CCU) at both Azadi teaching hospital and Kirkuk Teaching hospital. A non-probability (convenience) sampling process was obtained to select a sample of (1100) cardiac diseases patients admitted to CCU.

Through extensive review of relevant literature and medical resources, a questionnaire was constructed for the purpose of the study. Overall items included in the questionnaire were (27) items, part I demographic characteristics (6) items., Part II, dietary and nutrological factors of the participants (10 items) using a Yes/No scale. Part III Items related cardiac disease according to Times of day (4) items (early

morning, morning, afternoon and evening/night). Part IV occurrence of cardiac disease according to days of week (7) items. Part III, cardiac events according to days of week.

A content validity was determined by presenting the questionnaire to a panel of (10) experts in adult health nursing, Those experts were asked to review the questionnaire for content clarity, relevancy, and adequacy, their responses indicated that minor changes should be performed on few items. All modifications were made relative to their recommendations. The reliability of the questionnaire was carried out on (10) subject. The participants in the pilot study have the same criteria of the original study sample and were excluded from the main study.

The correlation coefficient that used to estimate the test-retest reliability coefficient was (0.80), which indicated adequate level of reliability. Data were collected using interviewer administration technique, from the period 1 February through 31 Juley 2026 to determine risk factors and cardiac diseases frame time. The statistical tests which were applied for the data analysis included both descriptive (frequencies, percentage) and inferential statistics (Pearson Chi-square, Cramer's v test, Monte -Carlo test and, Additionally, a Chi-Square Goodness-of-Fit Test was performed for each factor to determine if the distribution of 'Yes' and 'No' responses deviated significantly from an expected equal distribution (50%).") by means of statistical package for social science (SPSS) version 29.

Ethical Approval

At the beginning of the study, an ethical approval was granted by the research ethics committee, college of nursing. Ref. No. (5) Dated (29/6/2026). All participants were informed of the study's purpose, procedures, expected duration, and their right to withdraw at any stage without affecting their professional standing.

Results

Table 1 Shows that the higher percentage (29%) was observed among participants aged (50-59 years) followed by (60-69) accounted (24%) and the lowest percentage was (1%) for the age group (10-19 years) revealing high prevalence among older age. Males (60%) were more than females (40%), married subjects represented (66%), not read /write patients accounted (35%), 75% of the sample lived in urban and (40%) of them were housewife.

Table 1. Distribution of the sample according to their demographic data (N=1100).

Age Group	**Frequency**	**%**
(10-19)years	11	1%
(20-29)years	22	2%
(30-39)years	33	3%
(40-49)years	187	17%
(50-59)years	319	29%
(60-69)years	264	24%
(70-79)years	231	21%
(80-89)years	33	3%
Gender	**F**	**%**
Male	660	60%
Female	440	40%
Marital status	**F**	**%**
Single	77	7%
Married	726	66%
Divorced	33	3%
Widow	264	24%
Level of education	**F**	**%**
Read/ Write	319	29%
Not Read /Write	385	35%
Primary	77	7%
Intermediate	66	6%
Secondary	55	5%
College	132	12%
Instituted	66	6%
Address	**F**	**%**
Urban	825	75%
Rural	275	25%
Occupation	**F**	**%**
House Wife	440	40%
Self employee	231	21%
Governmental Employee	143	13%
Student	55	5%
Retirement	187	17%
Army group	44	4%

Source: Own authorship.

Table (2) presented that factor 9 yielded the highest level of agreement among respondents, with 88.82% (f = 977) selecting 'Yes' ($\chi^2 = 662.909$, $p < 0.001$). Conversely, factor 3 demonstrated the lowest agreement rate, with 71.00% (f = 781) of the

participants choosing 'No' (χ^2 = 194.040, p < 0.001). Notably, factor 8 was the only variable that did not exhibit a statistically significant difference (χ^2 = 0.131, p = 0.717). The sample split nearly evenly, with 49.45% responding 'Yes' and 50.55% responding 'No', establishing a lack of consensus regarding this specific dietary element. Nine out of ten dietary and nutrological factors were highly significant (p < 0.001).

Table 2. Dietary factor (pattern) of the cardiac diseases patients. N=(1100).

	Items	Yes		No		Chi-Square X2	p-value
		F	%	F	%		
1.	Do you frequently consume highly processed or packaged foods?	482	43.82	618	56.18	16.833	< 0.001 Highly significant
2.	Do you frequently eat fatty or high-fat meat?	437	39.72	673	61.18	50.633	< 0.001 Highly significant
3.	Do you take processed meats, such as sausages, luncheon meat, or salami?	319	29	781	71	194.040	< 0.001 Highly significant
4.	Do you eat fast food every day?	722	65.64	378	34.36	107.575	< 0.001 Highly significant
5.	Do you usually add extra salt to your food after it is served?	637	57.91	463	42.09	27.524	< 0.001 Highly significant
6.	Do you habitually use salty foods, such as chips, pickles, or salted nuts?	799	72.64	301	27.36	225.458	< 0.001 Highly significant
7.	Do you adapt sweets, cakes, biscuits, or pastries?	813	73.91	287	26.09	251.524	< 0.001 Highly significant
8.	Do you regularly have full-fat dairy products, such as full-fat milk, cream, or cheese?	544	49.45	556	50.55	0.131	0.717 Not significant
9.	Do you usually take fruits and vegetables ?	977	88.82	123	11.18	662.909	< 0.001 Highly significant
10.	Do you commonly eat foods high in saturated fat?	734	66.73	366	33.27	123.105	< 0.001 Highly significant

F=Frequency, %= Percentage. Source: Own authorship.

Table 3 across the four time periods of day, the distribution of cardiac diseases and arrhythmias were varied. The highest percentage of cardiac diseases was (34.0) observed during (Morning) time, Myocardial infarction represented (17.0%) of them, whereas (31.0) was most frequently occurred during (Evening) time in which angina represented (19.0%) of total sample . Regarding Atrial Fibrillation, the distribution was even across morning, afternoon and evening (22 patient in each period), SVT seen mostly at morning (33 of 55 SVT cases 60%), VT,PVC and BBB appeared less values compared to others. The association between cardiac conditions occurrence and time of the day was statistically significant (X^2 =273.96, P<0.001, df=18) A Cramer's of V=0.288 indicated moderate association between cardiac conditions occurrence and time of the day.

Table 3. Distribution of cardiac diseases occurrence according to (times) of day.

CDS / Times	MI		Angina		AF		SVT		VT		PVC		BBB		Total %
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	
Early Morning	33	3.0	33	3.0	0	0.0	11	1.0	0	0.0	11	1.0	0	0.0	8.0
Morning	**187**	**17.0**	132	12.0	**22**	2.0	33	3.0	0	0.0	0	0.0	0	0.0	**34.0**
Afternoon	121	11.0	132	12.0	**22**	2.0	11	1.0	11	1.0	0	0.0	0	0.0	27.0
Evening & night	99	9.0	**209**	**19.0**	**22**	2.0	0	0.0	0	0.0	0	0.0	11	1.0	**31.0**
Total	440	40.0	506	46.0	66	6.0	55	5.0	11	1.0	11	1.0	11	1.0	1100
Pearson Chi-square X^2 =(18)² =273.96 , p<0.001 , df=18 , Cramer's V=0.288 Monte-Carlo test p<0.001															

Source: Own authorship.

Table 4 displayed the highest percentage of cardiac diseases occurrence, (20.0%) arises on (Friday) followed by (18.0%) on Sunday. MI subjects mostly occur on Sunday (9.0%) of total sample and during Friday (8.0) whereas, Angina appear through Friday (11.0%) on second high day, Saturday accounted (12.0). A significant statistical association present between cardiac diseases and arrhythmias and day of week (X^2 = 526.05, p<0.001, df=36). For frequencies less than 5, Monte – Carlo test was used, a moderate association was proved by Cramer's V=0.282.

Table 4. Distribution of cardiac diseases according to (days) of week.

CDS (day)	MI		Angina		AF		SVT		VT		PVC		BBB		Total
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	
Saturday	44	4.0	**132**	**12.0**	22	2.0	0	0.0	0	0.0	0	0.0	0	0.0	**18.0**
Sunday	**99**	**9.0**	66	6.0	0	0.0	0	0,0	0	0,0	0	0.0	11	1.0	16.0
Monday	66	6.0	11	1.0	22	2.0	11	1.0	0	0.0	0	0.0	0	0.0	10.0
Tuesday	44	4.0	55	5,0	22	2.0	33	3.0	0	0.0	0	0.0	0	0.0	14.0

Wednesday	33	3.0	55	5.0	11	1.0	0	0.0	0	0.0	0	0.0	0	0.0	9.0
Thurs day	66	6.0	66	6.0	0	0,0	0	0.0	11	1.0	0	0.0	0	0.0	13.0
Friday	**88**	**8.0**	**121**	**11.0**	0	0,0	0	0.0	0	0.0	11	1.0	0	0.0	**20.0**
Total	440	40.0	506	46.0	77	7.0	44	4.0	11	1.0	11	1.0	11	1.0	1100
Pearson Chi-square X^2 (36)^2 = 526.05 , p<0.001 , df=36 , Cramer's V=0.282 , Monte -Carlo p<0.001															

Source: Own authorship.

Discussion

The current research indicated that the greatest prevalence (26%) of heart ailments was found in individuals aged 50 to 59 years. This result suggests that heart disease is not limited to older persons, but rather constitutes a significant health burden during middle life. The cumulative impact of cardiovascular risk factors over time, such as smoking, physical inactivity, obesity, dyslipidemia, diabetes mellitus, hypertension, and other metabolic and behavioral factors, may be reflected in the observed pattern. According to recent population-based data, the contribution of modifiable risk factors to cardiovascular disease varies with age, with behavioral and metabolic factors continuing to play a significant role in middle life. Specifically, smoking, abdominal obesity, and hypertension have been found to be significant risk factors for cardiovascular disease in a variety of age groups **[6]**.

The study also reported that male represented the higher percentage (60%) compared to female (40%). This finding is consistent with whom emphasized that the prevalence of cardiac events was high predominant among male than female **[7]**. A review conducted by Tamirisa et al. stated that lifetime risk of developing (atrial fibrillation) is higher in men compared with women, although women have a higher overall prevalence at older age because of their life expectancy **[8]**.

There was a significant impact of residential address on cardiac disease occurrence, with the highest percentage (75%) in urban areas compared to lowest percentage (25%) in rural areas. This geographical imbalance is supported by modern cardiovascular surveillance data. Recent findings by Wadhera et al. (2024) **[9]** and Jia et al. (2025) **[10]** substantiate that residential areas determine highly contrasting trends in cardiovascular health, thereby clarifying that the gap between urban and rural cardiac outcomes has shifted significantly over the last decade.

In regard to level education, the study reported that (35%) of the patients were illiterate, the result of ours study was strongly concur with the prospective analysis by the GreECS Long term study (2026) **[11]**, which stated that a low educational status **[fewer than 9 year of schooling]** significantly increased the risk of recurrent acute coronary heart diseases and doubles the causes of mortality rate. Similarly, an extensive surveillance review by Rising researchers (2024) **[12]**, reinforces that lower educational status remains the powerful, independent factor of cardiovascular risk and poorer long term clinical outcome.

Demographic data showed that married individuals represented the highest percentage of cardiac participants (66%), followed by widowed patients (24%). This finding contrasts with a study by Chun Wong (2018) **[13]**, that identified unmarried cases—particularly divorced and widowed—as having significantly increased odds of cardiovascular disease and mortality (OR 1.42 and 1.43, respectively). The inconsistence is likely attributable to local sample age clustering, where the predominance of married participants masks the comprehensive epidemiological trend relating unmarried status with heightened cardiovascular risk profile.

The study found that cardiac diseases occur highly among housewives (40%), followed by the lower incidence (21%) for self- employed . The aforementioned finding may be interpreted by the fact that women in the housewife category attributed to several factors such as sedentary lifestyles, stressful work conditions, compromised die and others **[14]**. Latest studies (2023–2025) have stated that socioeconomic status, occupation, and lifestyle contribute significantly to cardiovascular disease risk. Research has reported that individuals with less physical activity and higher rates of obesity— were common characteristics observed among many housewives in developing countries—have a higher risk of developing hypertension, coronary artery disease, and other cardiovascular conditions. Moreover, psychosocial stress and limited participation in structured exercise have been associated with poorer cardiovascular outcomes **[15]**.

From a nutrological perspective, the statistical analysis revealed highly significant differences in the majority of dietary factors ($p < 0.001$). The results of this study show that participants clearly and statistically significantly agreed that dietary patterns are important modifiable risk factors for heart and coronary artery diseases. The 2026 American Heart Association (AHA) Dietary Guidance to Improve Cardiovascular Health is firmly aligned with the

majority consensus on some high-risk items (e.g., Factor 9 at 88.82% and Factor 7 at 73.91%). The AHA structural frameworks place a strong emphasis on moving entirely away from individual nutrient tracking and toward developing holistic, lifelong eating habits that significantly restrict salt, trans fats, and added sweets while emphasizing raw plant-based meals **[16]**.

Additionally, the essential physiological pathways identified in recent clinical literature are reflected in the clear segmentation of responses revealed in our findings. By improving lipid profiles, reducing systemic inflammation, and lowering the risk of myocardial infarction, following organized dietary patterns like the DASH or Mediterranean diet offers proven cardiovascular protection, according to a thorough longitudinal research by Maki et al. (2026) **[17]**. On the other hand, a high dietary dependence on ultra-processed foods, refined carbohydrates, and saturated fats sourced from animals has been repeatedly associated with an increased risk of coronary artery disease and hastened atherogenesis. The present study presented study's large distribution of "Yes" answers attests to the targeted sample's high baseline awareness of these dietary concerns, which is a prerequisite for putting localized public health interventions and nursing-led nutritional education initiatives into action.

Distribution of the sample cardiac diseases according to the (Times) of day and days of week

The current study illustrates that cardiac disease was most commonly observed at the morning (34%), followed by the evening (31%). Myocardial infarction (187 of 440 MI cases 42.5%) occur during morning, whereas angina represented (209 of 506 angina cases 41.3) that occurs during evening/night. This pattern in accordance with the circadian variation of cardiovascular episodes stated in previous studies. Physiological alterations occurring through the transition from sleep to wakefulness, including a rapid elevation in blood pressure, improved sympathetic nervous system function, increase catecholamines, raised platelet aggregation, and greater vascular tone, may lead to the increased acute cardiac events during the (morning hours) **[18]**.

Latest cardiovascular statistics reported by the American Heart Association continue to identify circadian alterations as a significant factor affecting the onset of acute myocardial infarction and other cardiovascular events. These physiological reactions raised myocardial oxygen need while simultaneously promoting thrombosis, thereby increasing the susceptibility of ischemic events in vulnerable persons. In the present study, this mechanism may explain why the morning period exhibited for the highest percentage of cardiac disease occurrence **[19,20]**.

A study had illustrated in her study that atrial fibrillation had occurred in morning/ night, ventricular tachycardia/fibrillation had occurred in morning **[21]**. While Iraqi studies examining circadian patterns of myocardial infarction are scarce, latest research from Baghdad confirmed that the timing of symptom onset influences health care seeking behavior, with individuals experiencing symptoms during night time hours being more likely to delay hospital presentation **[22]**. Similarly, a study conducted in Basrah highlighted the clinical importance of the timing of admission by reporting poorer outcomes among participants admitted during off – hours. These results suggest temporal factors may affect both the occurrence and clinical management of cardiac events in Iraqi population **[23]**.

The present study showed that the highest occurrence of cardiac disease was observed on Friday (20%), followed by Saturday (18%). The variation in the frequency of cardiac events across the days of the week suggests that behavioral and physiological changes associated with weekends may influence the temporal distribution of cardiovascular events.

One possible explanation is the changes in daily lifestyle that commonly happens during weekends. Compared with working days, weekends are often characterized by changes in meal timing, increased consumption of energy-dense foods, reduced physical activity, emotional stress associated with family or social gatherings, and irregular sleeping habits. Although these predictors were not directly assessed in the present study, they have been identified as potential contributors to short-term cardiovascular risk in susceptible people. Recent findings also indicates that social variable and lifestyle behaviors play a crucial role in cardiovascular health **[24]**.

Another plausible mechanism is social circadian misalignment, which refers to the discrepancy between biological and social sleep schedules during weekends. Latest researches have demonstrated that irregular sleep timing can interrupt circadian rhythms, sympathetic over activity, exaggerate the morning blood pressure surge, and induce metabolic dysfunction and vascular inflammation. These physiological alterations may increase the susceptibility to acute cardiovascular events, particularly among individuals with underlying cardiovascular risk factors **[25]**.

The impact of weekend garnered considerable attention in cardiovascular studies. Recent studies indicate that patients admitted to hospitals on the weekend may experience less clinical outcomes

compared to those treated on weekdays, perhaps due to variations in healthcare access and hospital staffing. While these researches mainly assessed disease prognosis instead of incidence, they highlight that time elements can affect cardiovascular incidents and their clinical outcomes **[26]**.

Data from Iraq concerning the allocation of cardiac issues based on the day of the week is not enough. A recent survey in Baghdad revealed that the onset timing of symptoms considerably impacted the delay in obtaining medical treatment for patients experiencing acute myocardial infarction, suggesting that time factors may also influence the clinical manifestation and treatment of cardiovascular diseases in Iraqi people. To ascertain whether the weekly distribution found in the current study is constant throughout the nation, more multicenter research from several Iraqi governorates is needed **[20].**

Conclusion

Young adult people, men, married people, illiterate, cities residents, and housewives were at risk factors for heart illnesses. Additionally, dietary and nutrological factors were significantly related to cardiac diseases and conduction disorders. There was a noticeable rise in the prevalence of heart illnesses throughout the morning and evening hours, with MI occurring on Sundays and Fridays and angina on Saturdays. Time (hours) of day and days of week were found to have a moderate significant correlation with heart problems.

CrediT

Author contributions: **Conceptualization-** All authors; **Investigation-** All authors. **Methodology-** All authors; **Project administration-** All authors; **Supervision-**All authors; **Writing - original draft-** All authors; **Writing-review & editing-** All authors.

Acknowledgment

Not applicable.

Ethical Approval

At the beginning of the study, an ethical approval was granted by the research ethics committee, college of nursing. Ref. No. (5) Dated (29/6/2026). All participants were informed of the study's purpose, procedures, expected duration, and their right to withdraw at any stage without affecting their professional standing.

Informed Consent

It was applicable.

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The authors declare no conflict of interest.

Similarity Check

It was applied by Ithenticate@.

Application of Artificial Intelligence (AI)

Not applicable.

Peer Review Process

It was performed.

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