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RESEARCH ARTICLE

MOST COMMON CARDIAC ARRHYTHMIA IN ADULTS AND ASSOCIATED OTHER DISORDERS

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Abstract

Objective: The main objective of the study is to find the prevalence of atrial fibrillation in adults (male and female) at selected hospitals in Saudi Arabia. Other than this, the researcher will also try to know about the common disorders associated with AF, like hypertension, diabetes, and thyroid dysfunction.

Methods: A cross-sectional observational methodology will be used in this study to ascertain the prevalence of atrial fibrillation (AF) and how it is related to other conditions in Saudi Arabian adult patients. Finding patterns and connections at a certain moment in time is ideal for this methodology, which is especially helpful for epidemiological evaluations in clinical populations.

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Results: The study included 400 participants. The most frequent gender among them was male (n=219, 54.8%) and female (n=181, 45.3%). The most frequent age group among study participants was 18-29 years (n=196, 49.0%), followed by 30-39 years (n=103, 25.8%), and then 40-49 years (n=40, 10%). The most frequent

nationality among study participants was Saudi (n=350, 87.5%) and non-Saudi (n=50, 12.5%). Marital status among study participants, with most of them being single (n=240, 60%), followed by married (n=160, 40%). Occupations among study participants: most of them were employed (n=227, 56.8%), followed by students (n=98, 24.5%), then unemployed (n=75, 18.8%). The Smoker among study participants, most of them were non-smokers (n= 262, 65.5%), followed by smokers (n=98, 24.5%), then former smokers (n=40, 10%). Among the 138 participants of smokers and former smokers, most of them had been smoking for 1-5 years (n=46, 33.3%), followed by those who smoked for more than 10 years (n=42, 30%), then those who smoked for 6-10 years (n=38, 28%). The most frequent BMI among study participants was normal weight (n=172, 43%), followed by overweight (n=124, 31%), then obesity class I (n=54, 13.5%). Participants were asked if they had ever been diagnosed with any cardiac arrhythmia. Most of them answered no (n=318, 79.8%) and yes (n=82, 20.5%). And if the answer were yes, mention the type. The most frequency type was atrial fibrillation (n=24, 29%). Participants were asked about their family history of heart disease or arrhythmia. The most frequent were yes (n= 43, 52.4%), followed by don't know (n= 23, 28%), then no (n=16, 19.5%).

Conclusion: The study findings demonstrated clear associations between cardiac arrhythmias and several demographic and behavioral factors, including age, BMI, smoking duration, and caffeine intake, indicating the potential role of these variables in the development of arrhythmias.

Introduction:-

The broad category of cardiovascular illnesses known as cardiac arrhythmias is defined by irregular electrical activity in the heart, which frequently results in irregular heart rhythms and rates. [1] Atrial fibrillation, or AF, is the most common and clinically relevant of these, especially in the elderly and adult population. Rapid, erratic atrial activity that leads to inefficient atrial contraction and an abnormally irregular ventricular response is what defines atrial fibrillation (AF). Due to its strong correlation with elevated risks of stroke, heart failure, hospitalization, and all-cause mortality, AF has clinical significance beyond rhythm disruption. [3], [5] As the world's population ages and the burden of non-communicable disorders including obesity, diabetes mellitus, and hypertension rises, atrial fibrillation is becoming more common. [2] A substantial epidemiological shift has occurred in Saudi Arabia over the last few decades, with a notable increase in lifestyle-related disorders that are known risk factors for atrial fibrillation. Increases in life expectancy, dietary modifications, and sedentary lifestyles have all led to a rise in metabolic and cardiovascular diseases. In spite of this, there is still a dearth of information regarding the prevalence of AF in Saudi adults, and there are few thorough research examining its connections to other long-term illnesses. The majority of research that is currently accessible is hospital-based and does not take a comprehensive strategy that takes into account the multifactorial character of AF. [5], [6]

AF is frequently linked to a number of diseases. The most common comorbidity, hypertension, contributes to atrial remodeling and left atrial enlargement. Due to its correlation with myocardial fibrosis and systemic inflammation, diabetes mellitus has also been recognized as a significant risk factor. [2], [7] Obesity, ischemic heart disease, hyperthyroidism, and chronic kidney disease are other pertinent disorders. The interaction of these comorbidities worsens patient outcomes, makes managing AF more difficult, and raises the prevalence of AF. [4] Effective clinical management, risk stratification, and early detection of AF in Saudi Arabia depend on a better understanding of the condition's prevalence and comorbidity profile. It also encourages public health programs that try to lessen the prevalence of heart disease. [1]. [8] An inefficient atrial contraction caused by uncoordinated atrial activation is the hallmark of atrial fibrillation (AF), a supraventricular tachyarrhythmia. Atrial fibrillation (AF) is a clinically significant issue that is linked to important health and social issues. For clinicians, it can be difficult and complicated to handle. Additionally, it may result in hemodynamic abnormalities, thromboembolic events, and frequent hospitalizations, all of which worsen the quality of life for the patients and cause substantial morbidity and mortality. [9] Worldwide, the number of people with AF has been rising. According to a 2017 study conducted in New Zealand, the prevalence of admissions for AF was 10.4%. As people age, AF becomes more common. Based on four additional epidemiological studies, the Feinberg analysis showed that the prevalence of AF rose by 2.3% and 5.9% with age in the population over 40 and over 65, respectively. As the population ages, it is anticipated that the prevalence and incidence of AF will continue to rise. [6], [12], [9]

AF has a wide range of causes and can arise when a number of risk factors, both controllable and uncontrollable, are present. Chronic conditions like diabetes mellitus (DM), hypertension (HTN), hyperthyroidism, and several cardiac

illnesses are regarded as modifiable risk factors. [10] Risk factors that cannot be controlled include age, family history, and congenital heart conditions. Due to the fact that AF and chronic heart failure have similar risk factors, their prevalence is currently rising. After hypertension, heart failure is the second most common risk factor. According to a study on electrical alternans in patients with heart failure (ALPHA), AF is more common than 20% in heart failure patients, indicating a link between AF and chronic heart failure. [11], [12] In order to determine the prevalence of atrial fibrillation in Saudi Arabia's adult population and investigate its relationships to major systemic illnesses, this cross-sectional study was conducted. It is anticipated that the results would contribute to national policies for improving cardiovascular health in Saudi Arabia and offer evidence-based insights to guide clinical practice.

Rationale of the Study:-

An increasing clinical and public health concern within the category of cardiovascular illnesses, which are among the world's leading causes of morbidity and mortality, is cardiac arrhythmias, especially atrial fibrillation (AF). [13] The most prevalent prolonged arrhythmia in clinical practice AF, is linked to a twofold increase in the risk of all-cause death and a fivefold increase in the risk of stroke. Early detection and therapy of the illness are crucial because it frequently goes undiagnosed or is asymptomatic until problems occur. [14], [10] Saudi Arabia is witnessing a notable transition in its disease burden from communicable to non-communicable diseases (NCDs), similar to many other rapidly developing countries. [15], [16] Cardiovascular complications, including atrial fibrillation, are becoming more common in the population due to the increased prevalence of obesity, diabetes mellitus, hypertension, and thyroid disorders.

But even with AF's acknowledged worldwide significance, there is still a significant lack of local epidemiology data in Saudi Arabia. Arrhythmias and their concomitant patterns are not specifically addressed in the majority of the Kingdom's current research, which concentrates on cardiovascular illnesses in general. This might lead to insufficient or misguided healthcare planning and resource allocation for illnesses connected to arrhythmias. [17] This study's significance stems from its capacity to close this significant knowledge gap. Through a cross-sectional study conducted in Saudi Arabian tertiary care facilities, the study will offer up-to-date and locally pertinent information on the prevalence of atrial fibrillation in adults and its correlations with other systemic conditions like diabetes, hypertension, ischemic heart disease, thyroid dysfunction, and chronic kidney disease. This data is essential for identifying high-risk individuals early on, enabling prompt therapies and possibly averting serious consequences like heart failure or thromboembolic stroke. Furthermore, this study will shed light on demographic variables that may affect the risk of AF in the Saudi population, including age, gender, and BMI. These findings will be especially pertinent for researchers, policymakers, and healthcare professionals who want to create thorough screening, prevention, and management plans in light of the region's rising life expectancy.

Then, by detecting comorbidity patterns and indicating the necessity of interdisciplinary approaches in the treatment of AF patients, the study will enhance evidence-based decision-making in clinical settings. Additionally, it will improve the Saudi population's quality of life and support preventive healthcare. In conclusion, this investigation is both required and timely. It seeks to produce useful data that will enhance Saudi Arabia's national cardiovascular health programs, lower healthcare expenses, and improve patient outcomes.

Methods:-

Study design:-

A cross-sectional observational methodology will be used in this study to ascertain the prevalence of atrial fibrillation (AF) and how it is related to other conditions in Saudi Arabian adult patients. Finding patterns and connections at a certain moment in time is ideal for this methodology, which is especially helpful for epidemiological evaluations in clinical populations.

Study approach:-

Data will be collected via direct patient interviews and electronic medical records.

Study population:-

Adult patients who are 18 years of age or older and who are referred for ECG/Holter monitoring, attend cardiology outpatient departments, or are admitted to inpatient wards are included in the target population.

Study sample:-

The necessary sample size is estimated to be 400–500 participants based on literature that suggests an AF prevalence of roughly 2–4% in the general population and Cochran's formula for cross-sectional studies (with a 95% confidence interval and 5% margin of error).

Study tool:-

For the current study, the questionnaire was adopted for data collection, which was also categorized as a study tool.

Data collection:-

Data will be collected using:

Structured Case Record Form (CRF):

Sociodemographic data: Age, gender, BMI, smoking status, physical activity, and nationality.

Clinical data: History of hypertension, diabetes mellitus, thyroid disorders, ischemic heart disease, chronic kidney disease, and medication history.

Cardiac assessment: ECG findings, Holter monitor reports, echocardiography results, and symptom duration.

Data will be collected via direct patient interviews and electronic medical records.

Data analysis:-

It will be carried out on 10% of the total respondents (may be 30-40) and the results will be checked thereof. Further any type of discrepancy will be removed and questionnaire or data sheet will be revised. Pilot study may also be conducted to state the precision level of the statistical tools and even the selection criteria of the respondents. The above stated process will be followed throughout the pilot study, and the outcomes will be analyzed. The duration, manner, and viability will also be evaluated. Data will be analyzed using SPSS Ver. 27.0

Ethical considerations:-

Ethical approval will be obtained from an institutional review board (IRB) before the commencement of the study. All participants will provide informed consent, and the confidentiality of responses will be maintained. Participation will be voluntary, and no personal identifiers will be used in data analysis or reporting.

Results:-

The study included 400 participants. The most frequent gender among them was male (n=219, 54.8%) and female (n=181, 45.3%). Figure 1 shows the gender distribution among study participants. The most frequent age group among study participants was 18-29 years (n=196, 49.0%), followed by 30-39 years (n=103, 25.8%), and then 40-49 years (n=40, 10%). Figure 2 shows the age distribution among study participants. The most frequent nationality among study participants was Saudi (n=350, 87.5%) and non-Saudi (n=50, 12.5%). Figure 3 shows the distribution of nationality among study participants.

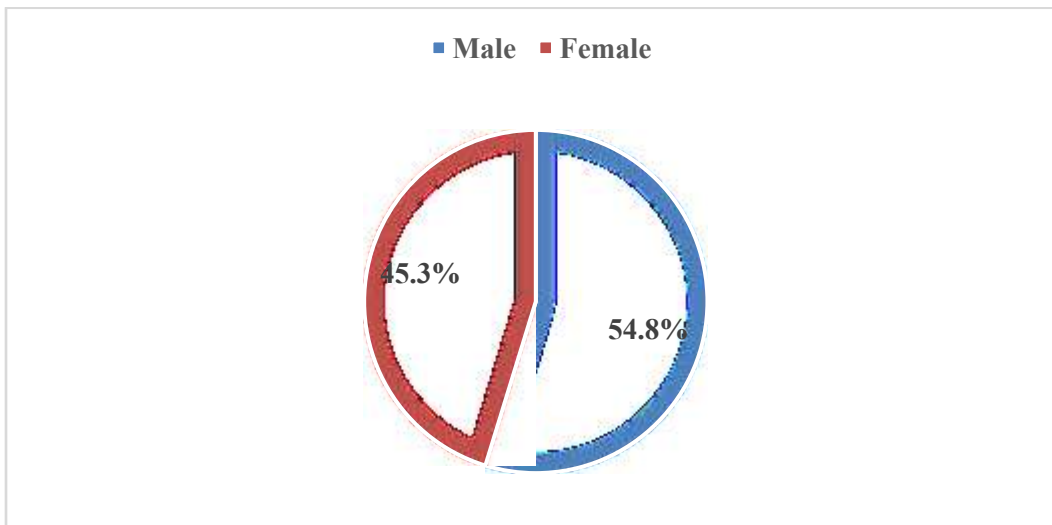


Figure 1: Gender distribution among study participants

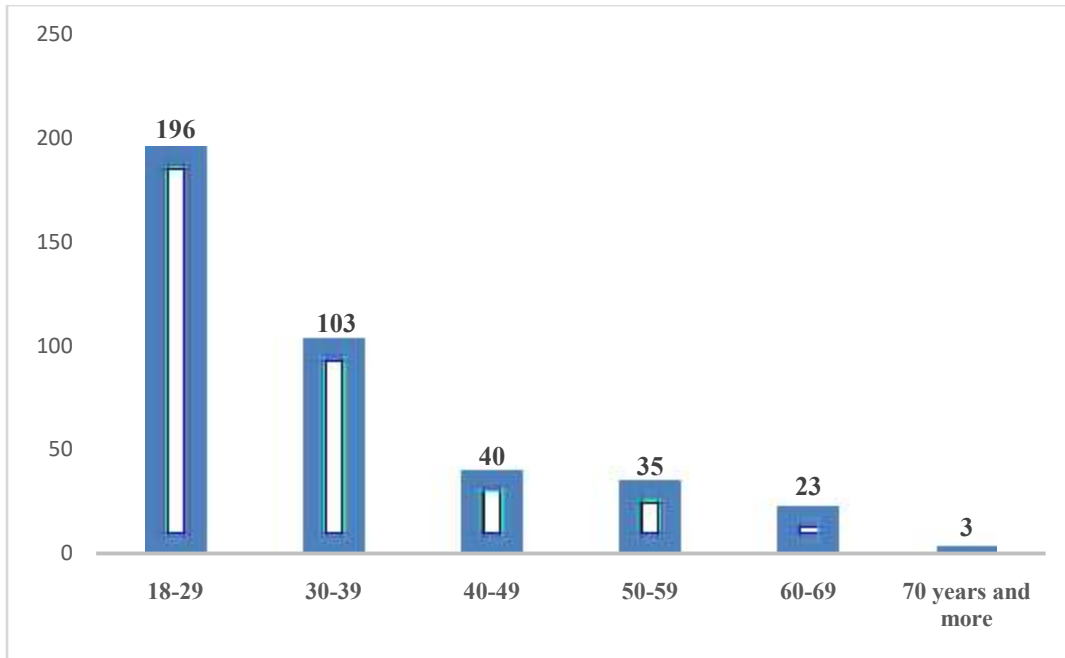


Figure 2: Age distribution among study participants

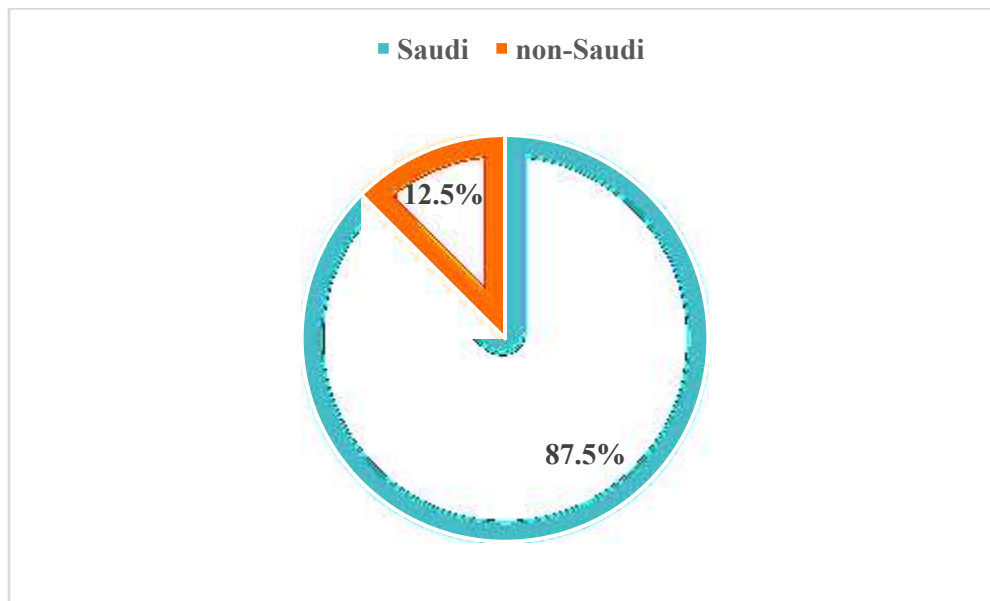


Figure 3: Nationality distribution among study participants

Marital status among study participants, with most of them being single (n=240, 60%), followed by married (n=160, 40%). Occupations among study participants: most of them were employed (n=227, 56.8%), followed by students (n=98, 24.5%), then unemployed (n=75, 18.8%). The Smoker among study participants, most of them were non-smokers (n= 262, 65.5%), followed by smokers (n=98, 24.5%), then former smokers (n=40, 10%). Among the 138 participants of smokers and former smokers, most of them had been smoking for 1-5 years (n=46, 33.3%), followed by those who smoked for more than 10 years (n=42, 30%), then those who smoked for 6-10 years (n=38, 28%). Smoke is presented in Figure 4.

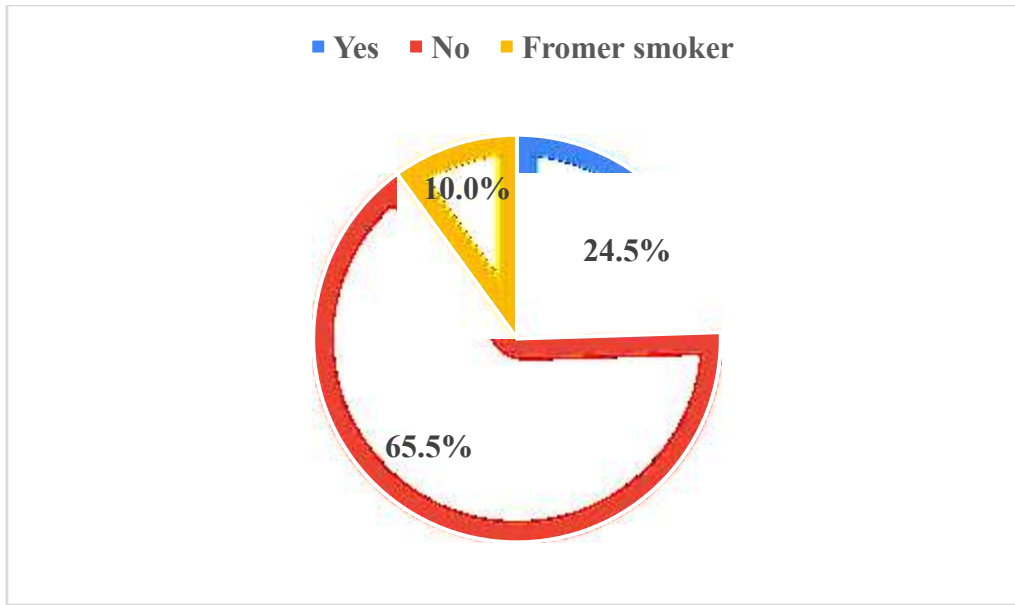


Figure 4: Smoke distribution among study participants

The most frequent BMI among study participants was normal weight (n=172, 43%), followed by overweight (n=124, 31%), then obesity class I (n=54, 13.5%). Figure 5 shows the BMI distribution among study participants.

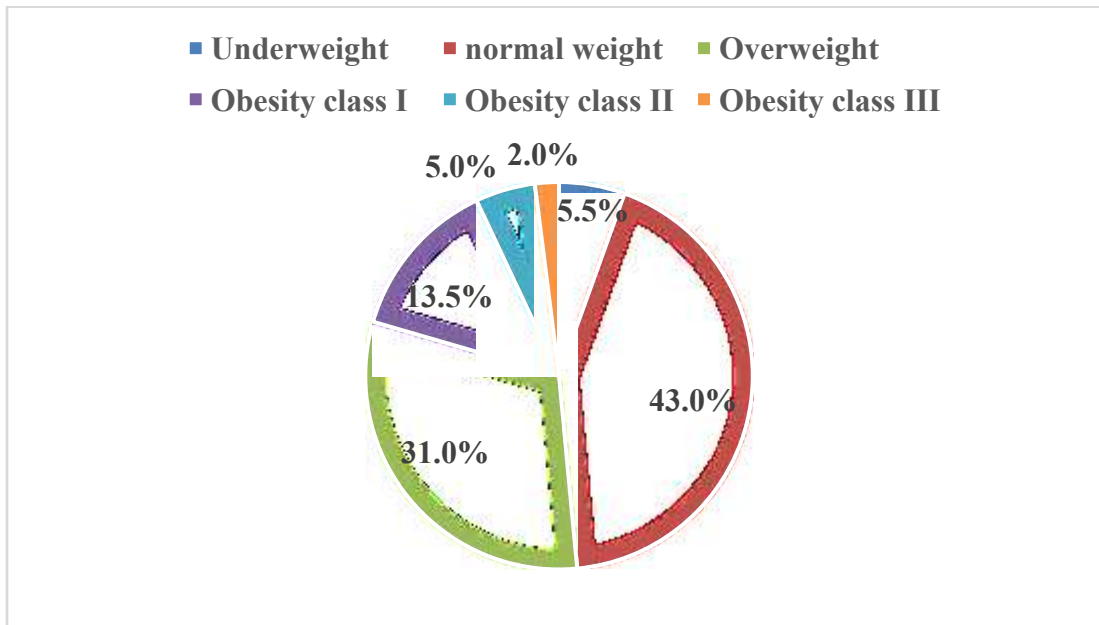


Figure 5: BMI distribution among study participant

Participants were asked if they had ever been diagnosed with any cardiac arrhythmia. Most of them answered no (n=318, 79.8%) and yes (n=82, 20.5%). And if the answer were yes, mention the type. The most frequency type was atrial fibrillation (n=24, 29%). The other responses and results are presented in Table 1.

Table 1: Types of cardiac arrhythmia reported by participants		
scale item	Frequency	Percent

Atrial fibrillation	24	29%
Atrial flutter	8	10%
Ventricular tachycardia	14	17%
Supraventricular tachycardia	20	24%
Other:	16	20%

Participants were asked about their family history of heart disease or arrhythmia. The most frequent were yes (n= 43, 52.4%%), followed by don't know (n= 23, 28%), then no (n=16, 19.5%). Figure 6 shows the family history of participants.

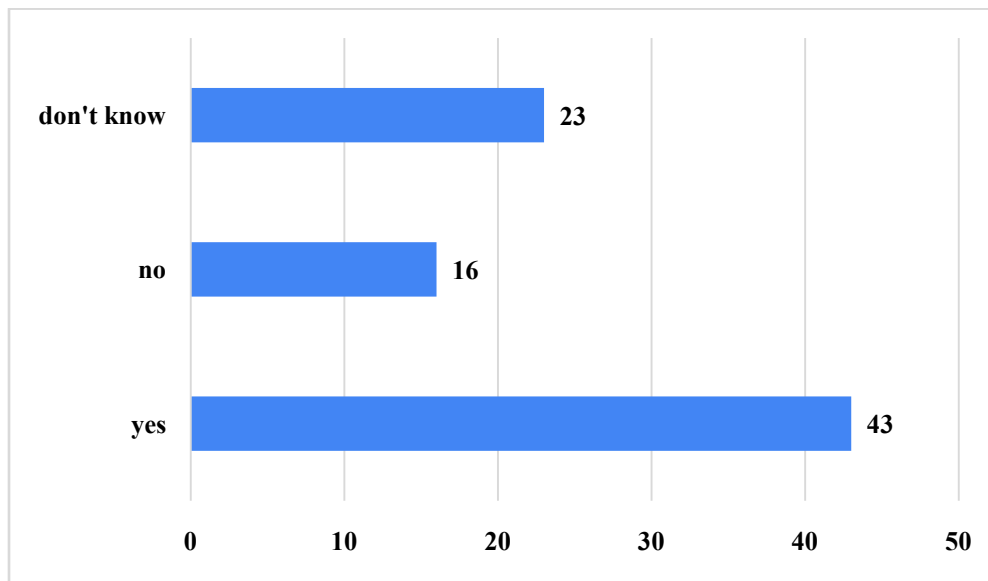


Figure 6: Family history distribution among study participants

Discussion:-

Annex 1: Data Collection Tool:-

S.N.	Question	Response
1	Age	<input type="checkbox"/> 18-29 years <input type="checkbox"/> 30-39 years <input type="checkbox"/> 40-49 years <input type="checkbox"/> 50-59 years <input type="checkbox"/> 60-69 years <input type="checkbox"/> 70 years and more
2	Gender	<input type="checkbox"/> Male <input type="checkbox"/> Female
3	Nationality	<input type="checkbox"/> Saudi <input type="checkbox"/> non-Saudi
4	Marital Status	<input type="checkbox"/> Single <input type="checkbox"/> Married

5	Education	<input type="checkbox"/> No formal education <input type="checkbox"/> Primary <input type="checkbox"/> Secondary <input type="checkbox"/> Graduate <input type="checkbox"/> Masters
6	Occupation of the respondent	<input type="checkbox"/> Employed <input type="checkbox"/> Unemployed <input type="checkbox"/> Student

S.N	Question	Response
7	Do you smoke?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Former smoker
8	If yes, how many years you have been smoking?	_____ years
9	Do you consume caffeine regularly (coffee, tea, energy drinks)?	<input type="checkbox"/> Yes <input type="checkbox"/> No
10	Do you engage in physical exercise?	<input type="checkbox"/> Yes <input type="checkbox"/> No
11	Height (cm)	_____ cm
12	Weight (kg)	_____ kg
13	Body Mass Index (BMI) (to be calculated by researcher)	_____

S.N	Question	Response
14	Have you ever diagnosed with any cardiac arrhythmia?	<input type="checkbox"/> Yes <input type="checkbox"/> No
15	If yes, please mention he type.	<input type="checkbox"/> Atrial fibrillation <input type="checkbox"/> Atrial flutter <input type="checkbox"/> Ventricular tachycardia <input type="checkbox"/> Supraventricular tachycardia <input type="checkbox"/> Other: _____
16	Duration since diagnosis	<input type="checkbox"/> <4 months <input type="checkbox"/> 4–10 months <input type="checkbox"/> 1–2 years <input type="checkbox"/> >2 years
17	Have you experienced the following symptoms?	<input type="checkbox"/> Palpitations <input type="checkbox"/> Laziness <input type="checkbox"/> Breathing Issue <input type="checkbox"/> Chest discomfort <input type="checkbox"/> Other: _____
18	Are you on medication for arrhythmia as of now?	<input type="checkbox"/> Yes <input type="checkbox"/> No
19	If yes, please specify medication	_____
20	Have you ever been hospitalized due to arrhythmia?	<input type="checkbox"/> Yes <input type="checkbox"/> No
21	Do you have a family history of heart disease or arrhythmia?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know

Status of the following diagnosis by the doctor:

Condition	Yes	No
1. Hypertension	<input type="checkbox"/>	<input type="checkbox"/>
2. Type 2 Diabetes Mellitus	<input type="checkbox"/>	<input type="checkbox"/>

3. Hyperthyroidism / Hypothyroidism	<input type="checkbox"/>	<input type="checkbox"/>
4. Chronic Kidney Disease	<input type="checkbox"/>	<input type="checkbox"/>
5. Ischemic Heart Disease	<input type="checkbox"/>	<input type="checkbox"/>
6. Heart Failure	<input type="checkbox"/>	<input type="checkbox"/>
7. Stroke or TIA (Transient Ischemic Attack)	<input type="checkbox"/>	<input type="checkbox"/>
8. Obesity (diagnosed)	<input type="checkbox"/>	<input type="checkbox"/>
9. Dyslipidemia	<input type="checkbox"/>	<input type="checkbox"/>
10. Other chronic conditions (please specify)	_____	<input type="checkbox"/>

Appendix 2: Participants' responses to scale items

Age	Frequency	Percent
18-29	196	49.0%
30-39	103	25.8%
40-49	40	10.0%
50-59	35	8.8%
60-69	23	5.8%
70 years and more	3	0.8%
Total	400	100%

Gender	Frequency	Percent
Male	219	54.8%
Female	181	45.3%
Total	400	100.0

Nationality	Frequency	Percent
Saudi	350	87.5%
non-Saudi	50	12.5%
Total	400	100.0

Marital Status	Frequency	Percent
Single	240	60.0%
Married	160	40.0%
Total	400	100.0

Education	Frequency	Percent
No formal education	8	2.0%
Primary	13	3.3%
Secondary	42	10.5%
Graduate	282	70.5%
Masters	55	13.8%
Total	400	100.0

Occupation	Frequency	Percent
Employed	227	56.8%
Unemployed	75	18.8%
Student	98	24.5%
Total	400	100.0

Smoke	Frequency	Percent
Yes	98	24.5%
No	262	65.5%
Former smoker	40	10.0%
Total	400	100.0

duration of smoking	Frequency	Percent
less than 1 year	12	9%
1-5 years	46	33%
6-10 years	38	28%
10 years and more	42	30%

Caffeine	Frequency	Percent
Yes	248	62.0%
No	152	38.0%
Total	400	100.0

diagnosed cardiac arrhythmia	Frequency	Percent
Yes	82	20.5%
No	318	79.5%
Total	400	100.0

level BMI	Frequency	Percent
Underweight	22	5.5%

normal weight	172	43.0%
Overweight	124	31.0%
Obesity class I	54	13.5%
Obesity class II	20	5.0%
Obesity class III	8	2.0%
Total	400	100.0

W level	Frequency	Percent
50 kg and less	30	7.5%
51- 65 kg	66	16.5%
66 - 75 kg	110	27.5%
76 - 85 kg	81	20.3%
86 - 95 kg	68	17.0%
96 kg and more	45	11.3%
Total	400	100.0

H level	Frequency	Percent
1.50 m and less	19	4.8%
1.51 - 1.60	98	24.5%
1.61 - 1.70	129	32.3%
1.71 - 1.80	111	27.8%
1.81 and more	43	10.8%
Total	400	100.0

		Frequency	Percent
Have you ever diagnosed with any cardiac arrhythmia?	yes	82	20.5%
	no	318	79.5%

		Frequency	Percent
Are you on medication for arrhythmia as of now?	yes	19	23.2%
	no	63	76.8%

		Frequency	Percent
Do you have a family history of heart disease or arrhythmia?	yes	43	52.4%
	no	16	19.5%
	don't know	23	28.0%

Have you experienced the following symptoms?	Palpitations	56	37%
	Laziness	20	13%
	Breathing Issue	43	29%
	Chest discomfort	31	21%

If yes, please mention the type.	Atrial fibrillation	24	29%
	Atrial flutter	8	10%
	Ventricular tachycardia	14	17%
	Supraventricular tachycardia	20	24%
	Other:	16	20%

Status of the following diagnosis by the doctor:	Yes	%	No	%
Hypertension	42	22%	40	6%
Type 2 Diabetes Mellitus	28	15%	54	9%
Hyperthyroidism / Hypothyroidism	10	5%	72	11%
Chronic Kidney Disease	9	5%	73	12%
Ischemic Heart Disease	21	11%	61	10%
Heart Failure	15	8%	67	11%
Stroke or TIA (Transient Ischemic Attack)	7	4%	75	12%
Obesity (diagnosed)	26	14%	56	9%
Dyslipidemia	24	13%	58	9%

Other chronic conditions (please specify)	8	4%	74	12%
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Chi-Square Test:

Test Statistics							
	Diagnosed with cardiac arrhythmia	Age	Gender	Smoke	Caffeine	BMI.level	Years of smoking
Chi-Square	139.240 ^a	385.820 ^b	3.610 ^a	286.265 ^c	23.040 ^a	341.600 ^b	4250.800 ^d
df	1	5	1	2	1	5	21
Asymp. Sig.	.000	.000	.057	.000	.000	.000	.000
a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 200.0.							
b. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 66.7.							
c. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 133.3.							
d. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 18.2.							

Sig. > 0 then there is a significant relation

The Chi-square test revealed statistically significant associations between the presence of cardiac arrhythmias and several key variables, including age, smoking status, caffeine consumption, BMI level, and years of smoking. These findings indicate that both lifestyle and demographic factors play an essential role in the development of arrhythmias. In contrast, no significant association was observed with gender and physical activity in this sample.

Conclusion:-

The study findings demonstrated clear associations between cardiac arrhythmias and several demographic and behavioral factors, including age, BMI, smoking duration, and caffeine intake, indicating the potential role of these variables in the development of arrhythmias.

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