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"ASSESSMENT OF KNOWLEDGE AND PREVALENCE OF RISK FACTORS OF SUDDEN CARDIAC ARREST/ SUDDEN CARDIAC DEATH AMONG YOUNG ADULTS IN SELECTED SERVICE SECTORS:A CLINICAL PHARMACIST INTERVENTIONAL STUDY."

Dr. NEELKANTREDDY. PATIL, Dr. KUSUMA MANASA, Dr. NETRANJALI KULKARNI, Dr. SANDESH MALKAPUR, Dr. SUSHMA SOPPAN.

ABSTRACT

In today's world sudden cardiac arrest (SCA) has become a growing concern of death among the young adults of age group (18-50 years). There are nearly 2 million cases of SCA occurring globally and hence the study related to the risk factors associated with SCA among the general population needs to be prioritized from a clinical and public health point. The reason behind the increasing incidence is risk factors such as stress, physical inactivity, and unhealthy lifestyle. Assessing and identifying the major risk factors and managing them can reduce the burden of the disease.

Objective: The study was based on assessing the knowledge and prevalence of risk factors of SCA/ sudden cardiac death (SCD) among young adults of selected service sectors in and around Kalaburagi city.

Methodology: The present study is a prospective educational interventional study conducted to assess the prevalence of risk factors and to determine the demographic variables (age, BMI, occupation, years of service) influencing the SCA/SCD among young adults of selected service sectors. The study was carried out after obtaining permission from the Institutional Review Board for a period of 6 months. The consent was obtained at the time of enrolment; respondents were given a self-designed knowledge assessment questionnaire along with a PSS and risk assessment questionnaire during the pre-test. Later the respondents were given an educational program through a patient information leaflet (PIL) and PowerPoint presentation and after 15 days of pre-test, the post-test was conducted using the same set of

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questionnaires. The collected data was analyzed as per the study objectives and the prevalence of risk factors were assessed.

Results: A total of 693 respondents from various service sectors in and around Kalaburagi were enrolled. According to the obtained results, we found that risk factors such as hypertension (HTN) 52(7.50%), diabetes mellitus (DM) 48(6.90%), alcohol consumption 122(17.60%), smoking 35(5.10%), inadequate sleep 423(61.00%), physical inactivity 407(58.70%), obesity 78(11.30%), covid19 130(18.80%), diet 328(47.30%), stress 72(10.40%). The observed significant mean knowledge score in the pre-test is 50.55% and the post-test is 79.15%. which showed a mean difference of 28.60%.

Conclusion: There is a significant shift in SCA/ SCD from elderly to young adults. Initial management can result in preventing the early chances of SCA/ SCD. Respondents have become aware by answering the knowledge-based questionnaire.

We conclude that targeting young adults in the selected service sectors and educating them with precise knowledge of SCA/SCD can lead to a positive impact on society. Hence our educational program helped the respondents to acquire proper knowledge, understanding, management, and prevention of SCA/ SCD.

Keywords:

Knowledge

Risk factors

Sudden Cardiac Death

Sudden Cardiac Arrest

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INTRODUCTION:

Sudden cardiac arrest (SCA): SCA is the sudden cessation of cardiac activity so that the victim becomes unresponsive, with no normal breathing and no signs of circulation. If corrective measures are not taken rapidly, this condition progresses to sudden death.[1]

Sudden cardiac death (SCD): SCD is death due to a cardiovascular cause that occurs within one hour of the onset of symptoms.[2]

Symptoms:

Before the arrest: Chest discomfort, Shortness of breath, Weakness and excessive sweating, Fast beating, fluttering, or pounding of the heart (palpitations).

Immediate: Sudden collapse, loss of consciousness, no breathing, no pulse.[2]

Risk factors:

Age, obesity, hypertension (HTN), stress, diabetes mellitus (DM), alcohol consumption, smoking, physical inactivity, inadequate sleep, unhealthy food habits,[3,4,5] suffered COVID-19*.[6] (*Still under research).

Causes:[2]

Ischemic heart disease (IHD):

Myocardial infarction, Coronary spasm.

Inherited channelopathies:

Long QT syndrome (LQTS), short QT syndrome (SQTS), Brugada syndrome, and ventricular tachycardia.

Cardiomyopathies:

Alcoholic, hypertrophic, idiopathic, obesity-related, fibrotic, myocarditis.

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Heart failure:

Non-preserved ejection fraction, systolic heart failure (EF less than 35%)

Valve Disease:

Aortic stenosis

Congenital diseases:

Tetralogy of Fallot

Complications:

Musculoskeletal Impairment:

Muscle weakness: Walking, rising from the chair, climbing stairs

Fine motor: Writing, grasping, tying shoelaces, texting, typing

Physical fatigue: Physical fatigue during prolonged activity

Vision: Difficulty reading, field cuts, blindness, hemispatial inattention.[7]

Neurological Impairment:

Seizures: Epilepsy

Stroke: Aphasia, locked-in syndrome, cognitive-communication disorders, anosognosia

Movement disorders: Chorea, tremor, akathisia

Ataxia, dysmetria: Gait/balance disturbance, dysarthria

Disorders of consciousness (DOC): Coma, vegetative state, minimally conscious

Brain death: Anoxic injury.[7]

Cognitive Impairment:

Attention: Sustained focus, ability to attend to X while ignoring Y

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Memory: Short-term (immediate and delayed recall), working (e.g., manipulating lists of numbers), long-term, prospective ("remembering to remember," e.g., taking medications, making appointments)

Executive function: Planning/organization, cognitive flexibility, self-regulation

Intellect: Ability to learn or acquire and apply knowledge

Language: Expressive aphasia, receptive aphasia, apraxia.[7]

Psychosocial Well-Being:

Anxiety, Depression, Post-traumatic stress disorder (PTSD), Quality of life (QOL), Spirituality/existential concern, Return to work, Personal relationships, reintegration, and return to intimacy.[7]

Difference between cardiac arrest and heart attack:

"People often use these terms interchangeably, but they are not the same."

What is a heart attack?

A heart attack is a "circulation" problem. A heart attack occurs when a blocked artery prevents oxygen-rich blood from reaching a section of the heart. If the blocked artery is not reopened quickly, the part of the heart normally nourished by that artery begins to die. The longer a person goes without treatment, the greater the damage.[8]

What is cardiac arrest?

SCA is an "electrical" problem. Sudden cardiac arrest occurs suddenly and often without warning. It happens when an electrical malfunction in the heart causes an irregular heartbeat (arrhythmia). With its pumping action disrupted, the heart can't pump blood to the brain, lungs, and other organs. When this occurs, a person loses consciousness and has no pulse. Death occurs within minutes if the victim doesn't receive treatment.[8]

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Management of SCA.

Management for sudden cardiac arrest should be initiated immediately by laypeople and emergency medical services (EMS). Treatment includes the use of an automated external defibrillator (AED) and cardiopulmonary resuscitation (CPR). CPR provides enough oxygen to the brain until a stable electrical rhythm can be established.[2]

CPR steps:

1. Check the scene for safety, form an initial impression, and use personal protective equipment (PPE)
2. If the person appears unresponsive, check for responsiveness, breathing, life-threatening bleeding, or other life-threatening conditions using shout-tap-shout
3. If the person does not respond and is not breathing or only gasping, call 1-0-8/1-0-2 and get equipment, or tell someone to do so
4. Kneel beside the person. Place the person on their back on a firm, flat surface
5. Give 30 chest compressions
    a. Hand position: Two hands centered on the chest
    b. Body position: Shoulders directly over hands; elbows locked
    c. Depth: At least 2 inches
    d. Rate: 100 to 120 per minute
    e. Allow the chest to return to normal position after each compression
6. Give 2 breaths
    a. Open the airway to a past-neutral position using the head-tilt/chin-lift technique
    b. Pinch the nose shut, take a normal breath, and make a complete seal over the person’s mouth with your mouth.
    c. Ensure each breath lasts about 1 second and makes the chest rise; allow air to exit before giving the next breath

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   d. **Note:** If the 1st breath does not cause the chest to rise, tilt the head and ensure a proper seal before giving the 2nd breath If the 2nd breath does not make the chest rise, an object may be blocking the airway

7. Continue giving sets of 30 chest compressions and 2 breaths, use AED as soon as one is available, and minimize interruptions to chest compressions to less than 10 seconds.[9]

How to use an AED:

1. Complete the check and call steps
2. As soon as an AED is available, turn it on and follow the voice prompt
3. Remove clothing and attach pads correctly
   a. Remove all clothing covering the chest. If necessary, wipe the chest dry
   b. Place one pad on the upper right side of the chest
   c. Place the other pad on the lower left side of the chest, a few inches below the left armpit
   d. **Note:** If the pads may touch, place one pad in the middle of the chest and the other pad on the back, between the shoulder blades
4. Plug the pad connector cable into the AED, if necessary
5. Prepare to let the AED analyze the heart's rhythm, make sure no one is touching the person
6. Deliver a shock, if the AED determines one is needed, make sure no one is touching the person,
   a. Push the "shock" button to deliver the shock
7. After the AED delivers the shock, or if no shock is advised, immediately start CPR, beginning with compressions.[10]

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Management of risk factors:

Risk factors can be managed by various non-invasive and non-pharmacological methods such as:

Obesity: Obesity can be managed by exercise followed by a healthy diet and maintaining a BMI between 18.5 and 25 for a healthy weight.[11]

HTN: hypertension can be managed by dietary approaches to stop hypertension (DASH) therapy and diet-based therapy and adhering to medication

Increase: Fruits and Vegetables

Decrease: Salt intake, Dairy products, saturated fats, red meat and sweets, and sweetened beverages. Adhere to the medicines and maintain blood pressure at (130/80mmHg).[12]

Stress: stress can be managed by yoga meditation mindfulness etc., Practicing deep breathing, and yoga asanas like- Bhastrika, Kapalabhati, Mushti mudras, Anulom-viloma, and all types of Pranayama. Make time for your hobbies such as music, singing, dancing, and traveling.[13]

DM: diabetes can be managed by a good nutrition-based diet, weight reduction, and physical activity.

Decrease: western dietary pattern, refined grains, processed and unprocessed red meat, white rice, and sugar-sweetened beverages.

Increase: vegetarian-based dietary patterns, green leafy vegetables, and whole grains.

Do not skip breakfast, and do not eat snacks between main meals.[14]

Regularly check and maintain sugar levels (90-140mg/dl), have small meals regularly, and avoid heavy meals at a time.

Targeted blood pressure in both DM and HTN populations must be maintained at 130/80mm/Hg.[15]

Adhere to medication

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Alcohol: Avoid alcohol consumption.

Smoking: Quit smoking.

Physical inactivity: Exercise, when done regularly, and with moderate- and vigorous-intensity physical activity, strengthens your heart muscle. This improves your heart's ability to pump blood to your lungs and throughout your body.[16]

Inadequate sleep: The average adult should sleep 7-8 hours per night regularly to promote optimal health.[17]

Food habits: Eating plenty of vegetables, fruits, and whole grains. Choosing fat-free or low-fat dairy products, fish, poultry, beans, nuts, and vegetable oils.

Limiting saturated and trans-fat intake, such as fatty meats and full-fat dairy products

Limiting drinks and foods that contain added sugars.

Restricting sodium intake to less than 2,300 milligrams per day - ideally 1,500 mg daily- and increasing consumption of potassium, magnesium, and calcium. High-fiber foods are also crucial for keeping the heart healthy.[18]

Have different locally available vegetables, seasonal fruits, millets, pulses, whole grains, and nuts. Use mustard, sesame, safflower, and sunflower oil in cooking, and have food at least 2-3 hours before sleep.

Prevention:

Obesity:

Nutrition and consumption:

Homely food environment, family meals, do not skip breakfast, avoiding sugary beverages/ fast foods.

Patterns of activity:

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Physical activity, decreased sedentary lifestyle, reduced screen time, adequate, and healthy sleep.[19]

HTN:

A variety of nonpharmacological interventions are effective in lowering BP and preventing hypertension.

Weight loss, reduced sodium intake, increased potassium intake, increased physical activity, reduced consumption of alcohol, and diets like the Dietary Approaches to Stop Hypertension (DASH) diet.[20]

Stress:

Cognitive-behavioral techniques, relaxation techniques, and organizational changes could be useful for preventing stress.[21]

DM:

Weight reduction, physical activity.

Decrease: western dietary pattern, refined grains, processed and unprocessed red meat, white rice, and sugar-sweetened beverages.

Increase: vegetarian-based dietary patterns, DASH diet, total dairy products, green leafy vegetables, and whole grains.

Do not skip breakfast, and do not eat snacks between main meals.[14]

Alcohol: Stop alcohol consumption.

Smoking: Quit smoking.

Physical inactivity: Engage in physical activities, sports, gym, walking, jogging, etc.,

Inadequate sleep: Have meals 3-4 hours before sleep, and perform physical activities.

Unhealthy food habits:

Healthy dietary patterns can be generally described as those that are rich in health-promoting foods, including plant-based foods, fresh fruits and vegetables, antioxidants, soya, nuts, and

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sources of omega-3 fatty acids, and low in saturated fats and trans fats, animal-derived proteins, and added/refined sugars.[22]

Establishing effective resuscitation protocols and increasing the availability of automated external defibrillators in settings where competitive sport is undertaken are the most effective strategies in helping reduce the incidence of sudden cardiac death.[23]

Epidemiology:

The global incidence of SCA/SCD is estimated at 0.03%-0.10% per year, yet the rate may vary in the general population due to the sheer size of the population at risk. The estimates tell us that there are nearly 2 million cases of SCA/SCD occurring globally and hence the study related to the risk factors associated with SCA/SCD among the general population needs to be prioritized from a clinical and public health point.[3]

The population-based study in the southern part of the Indian region found that the total contribution of SCD was 10.3% of overall mortality in the region. The average age of the SCD was 5-8 years less than in the western hemisphere, with a high prevalence of major risk factors for Coronary artery disease (CAD).[24]

In recent decades younger adults have tended to a high prevalence of unhealthy cardiovascular disease (CVD) risk profile, such as obesity, physical inactivity, and poor diet, which has been observed among young individuals living in developed countries. The rate of substance abuse is also increasing among young adults, in contrast to the trend towards a lower incidence of CVD in adults aged above 50 years. The reported trends for the incidence of CVD in young adults in the past few decades have mostly been steady or slightly increasing.[25]

Several factors affecting normal heart behavior lead to increased risk of cardiac arrest such as HTN, stress, DM, obesity, physical inactivity, smoking, high dietary sodium intake, low intake of fruits, Covid-19etc.,[3,4,5,6.] The common signs and symptoms of CVD include chest

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pain, weakness, feeling hot or flushed, shortness of breath, cold sweats, nausea, dizziness, pain in left arm and/or shoulder, back pain between and/or under shoulders, pain in both arms, pain in the right arm and/or shoulder, neck and/or throat pain, vomiting, headache, jaw and/or tooth pain, choking, change in taste of cigarettes, pain in legs, arms swollen, non-chest pain symptoms.[26]

Although advances in cardiac care have made some majestic improvements in cardiovascular outcomes, CVD remains the leading cause of death in various countries around the world.[27] A Decrease in the number of deaths caused by CVD has been observed over the past thirty years, but SCD has not seen the same improvement as other forms of heart disease mortality.[28]

The global incidence of SCA/SCD is estimated at 0.03%-0.10% per year, yet the rate may vary in the general population due to the sheer size of the population at risk. The estimates tell us that there are nearly 2 million cases of SCA/SCD occurring globally and hence the study related to the risk factors associated with SCA/SCD among the general population needs to be prioritized from a clinical and public health point.[3] The population-based study in the southern part of the Indian region found that the total contribution of SCD was 10.3% of overall mortality in the region. The average age of SCD was 5-8 years lesser than in the western hemisphere, with a high prevalence of major risk factors for Coronary artery disease (CAD).[24]

Largely missed opportunities at every step in the prevention and treatment of CVD:

Failure to Make Risk Factor Modifications

Failure to Diagnose

Failure to Provide Supportive Care.

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The failure to make modifications to risk factors can lead to CVD, which is the leading cause of preventable deaths. In addition to clinical factors, there are also some concerning trends in these risk factors such as the increasing prevalence of diabetes mellitus and childhood obesity and hypertension rates of 46% in adults additionally, smoking and vaping both negatively impact blood pressure control, and remain prevalent. The majority of the risk factors for SCD are modifiable, and monitoring them continuously helps to drastically reduce the risk of SCD-related morbidity and mortality. Upstream management promotes the management of the root causes of a problem, rather than just treating its symptoms, and hence it requires fundamental improvement, these risk factors call for a shift toward more upstream management rather than the current emphasis on downstream treatment.

For example: 14000 deaths could be prevented by increasing just 10% of the hypertension treatment.[27]

Providing knowledge about the management of modifiable risk factors such as monitoring of BMI, nutrition, obesity, physical activity, etc., can improve the respondents' risk factors, and lifestyle, such as increasing self-care and precautionary measures of the disease, further leading to a decrease in complications of the respondent and improved quality of life.[29]

Cardiac arrest is often fatal if appropriate steps aren't taken immediately, and in the present scenario, most people have knowledge related to the risk factors of SCA/SCD but lack in the managemental aspects of this area. By analyzing and providing knowledge related to risk factors and their management to the public, we can improve the efficiency rate of first aid and emergency management, which could reduce the mortality rate. As per recent events, the younger generation is under the shadow/verge of SCA/SCD, In this fast-growing world there is the burden of stress caused due to the unnatural workload, and due to changing lifestyles in the very recent trends of society due to all the global development factors, are leading to an

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unhealthy lifestyle of the individuals, promoting the rate of clumped risk factors which may increase the burden on the heart which together may further lead to SCA/SCD.

In this study, we mainly aimed to analyze the knowledge, stress levels, and risk factors related to SCA/ SCD in people of different service sectors and compare them during our study period as all fields will have different kinds of work, mobility, and stress. And analyze them with different analytical methods.

OBJECTIVES:

General objective:

To assess the prevalence of risk factors related to SCA/SCD

The role of clinical pharmacists in improving the knowledge regarding SCA/SCD

Specific objective:

To assess the socio-demographic details of the respondents in selected service sectors.

To assess the prevalence of risk factors regarding SCA/SCD.

To assess the basic knowledge of risk factors regarding SCA/SCD among young adults.

To provide pharmacist educational intervention.

To assess the impact of clinical pharmacist in improving their knowledge.

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MATERIALS AND METHODS:

Study approval:

The study was conducted, after obtaining permission from the Institutional Review Board (IRB) . The respondents working in selected service sectors who fit into the study criteria were enrolled in the study after obtaining written consent from them. The study was carried out in the following steps.

Consent form:

Written consent was taken from the enrolled respondents in a suitably designed consent form.

Source of data:

Respondents from selected service sectors.

Materials:

Data collection form.

Knowledge assessment questionnaires. Risk assessment

questionnaires. Perceived stress scale (PSS).[43]

Patient Information Leaflet (PIL).

Preparation of data collection form:

A data collection form is suitably designed to collect the required data for the study by using various resources like books, journals, the internet, and other relevant resources.

Preparation of knowledge assessment questionnaires:

A set of self-designed questionnaires were prepared to assess the knowledge of the respondents regarding risk factors of SCA/SCD and their management by using various resources like books, journals, the internet, and other relevant resources.

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Method of data collection:

Study site:

The study was conducted in selected service sectors in the Kalaburagi district of Karnataka state in India.

Study duration:

The study was conducted for a period of 6 months.

Study design:

Prospective Educational Intervention study.

Study criteria:

The study was carried out by considering the following criteria.

Inclusion criteria:

Respondents who are willing to participate.

Respondents of either sex.

Respondents falling under the age of 18-50 years in selected service sectors.

Respondents without any known CVD history.

Exclusion criteria:

Respondents who are not willing to participate in the study.

Respondents who already have a CVD history.

Respondents who are below 18 years and above 50 years.

Analysis of data:

Statistical data was analyzed by IBM SPSS 20.0 version software.

Collected data were spread on an Excel sheet and the master chart was prepared.

Through the master chart, tables and graphs were constructed.

For quantitative data analysis, mean and standard deviations were calculated, and paired and un-paired t-tests, ANOVA tests, and correlation tests were applied for statistical significance.

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For qualitative data analysis, the chi-square test and Fisher exact probability tests were applied for statistical significance.

If the P-value was less than 0.05 it was considered as significant.

Study procedure:

Socio-demographic data was collected by one-to-one interaction.

The prevalence of risk factors was noted by one-to-one interaction, other parameters like BMI were calculated and the stress of respondents was analyzed by PSS.

The basic knowledge regarding the risk factors of SCA/SCD and their management was analyzed by suitably designed knowledge assessment questionnaires. Thereafter, a pharmacist-led educational intervention was made by PowerPoint presentation and by providing them with an educational leaflet.

After 15 days of enrolment, on their second visit, knowledge regarding risk factors of SCA/SCD and their management was reassessed by using the same set of questionnaires. Finally, the impact of clinical pharmacist in improving the knowledge regarding risk factors and their management was assessed.

RESULTS:

During the study, a total of 747 respondents who fit the study criteria were enrolled after obtaining their written consent, out of which only 693 respondents have completed the study, hence the data related to those 693 respondents was considered for the study and analyzed.

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Table no. 1: Age-wise distribution of respondents.

Age in years	**Total**	
	No. of respondents	**Percentage**
21-30	212	30.60
31-40	291	42.00
41-50	190	27.40
Total	693	100.00
Mean ± SD	36.91 ± 7.82	
P- value	t = 0.808 P = 0.419, NS	

NS= not significant, S=significant, HS=highly significant

The study observed that the maximum number of respondents, 291 (42.0%) belonged to the age group of 31-40 years, followed by 212 (30.6%) belonged to the age group of 21-30 years, and 190 (27.4%) belonged to the age group of 41-50years. The minimum age of respondents was 21 years and the maximum age of respondents was 50 years. The mean age stood at 36.91. There was no statistically significant difference in age among gender (P>0.05).

Figure no. 1: Age-wise distribution of respondents.

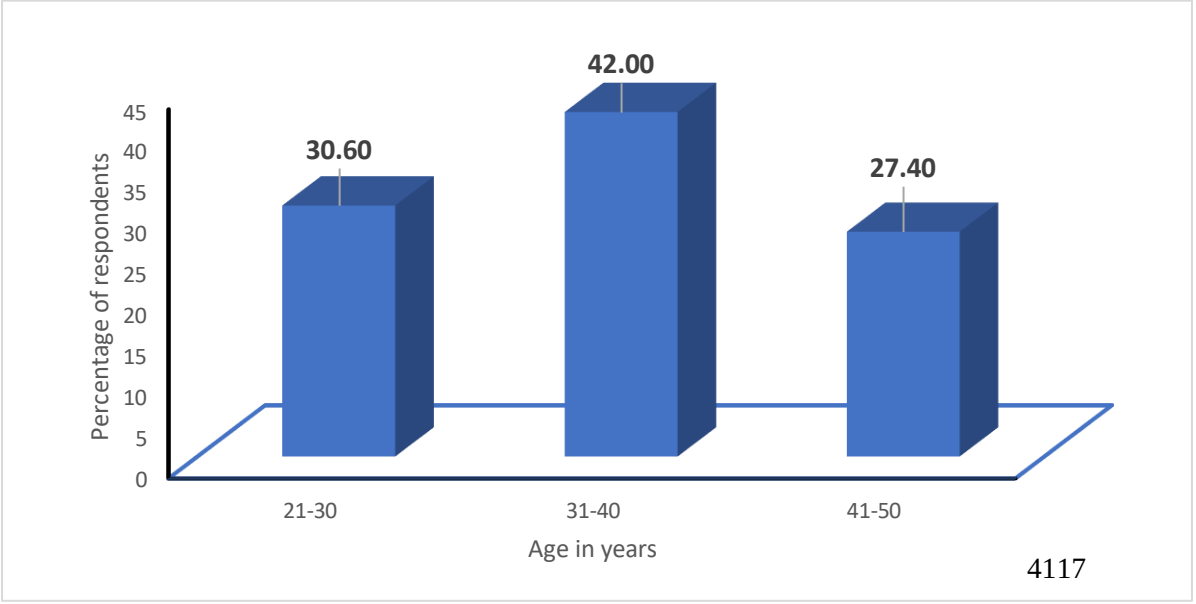

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Table no. 2: Gender-wise distribution of respondents.

Gender	No. of respondents	Percentage
Males	391	56.40
Females	302	43.60
Total	693	100.00

The study observed that 391 (56.4%) respondents were males and 302 (43.6%) respondents were females. The male-to-female ratio was 1.3:1

Figure no. 2: Gender-wise distribution of respondents.

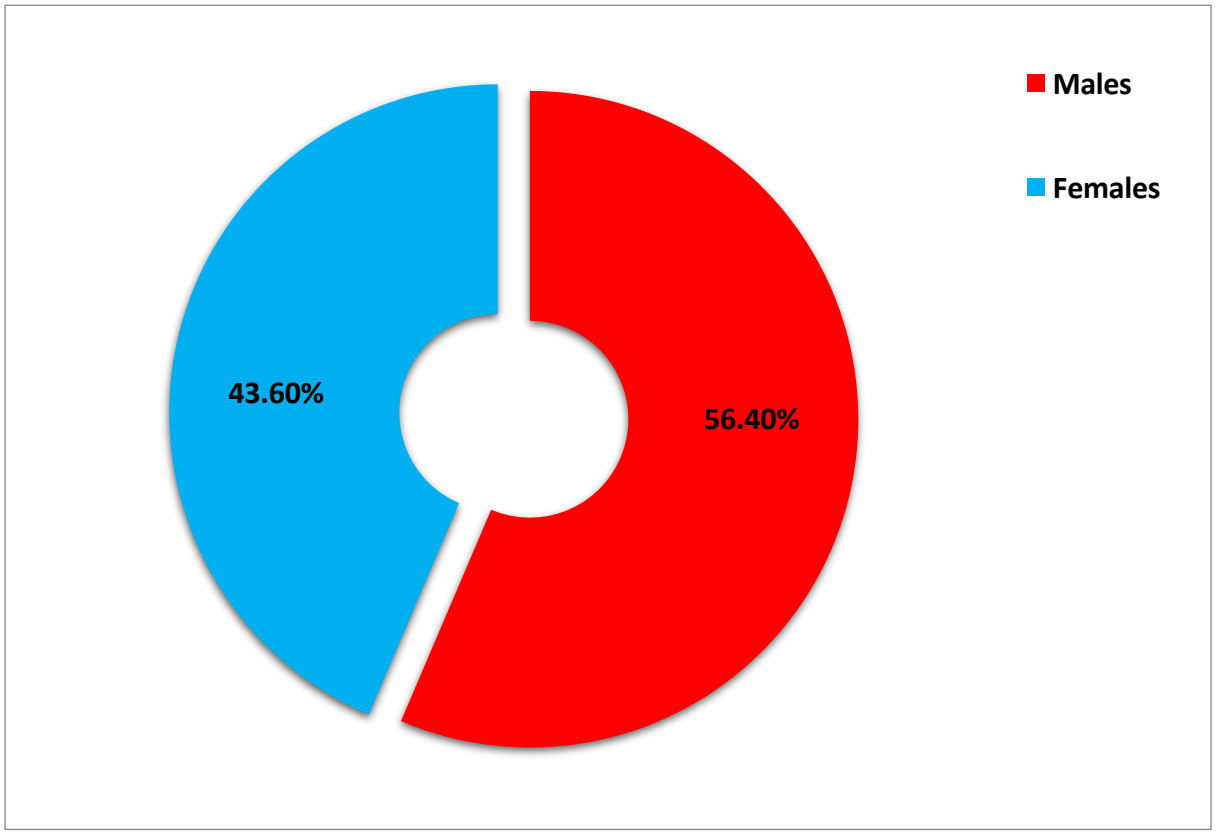

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Table no. 3: Occupation-wise distribution of respondents.

Occupation	No. of respondents	Percentage
Teaching profession	241	34.80
Bank employee	210	30.30
Police	242	34.90
Total	**693**	**100.00**

The study observed that the maximum number of respondents 242 (34.9%) belonged to the Police department, followed by 241 (34.8%) belonging to the teaching profession, and 210 (30.3%) belonging to the banking sector.

Figure no. 3: Occupation-wise distribution of respondents.

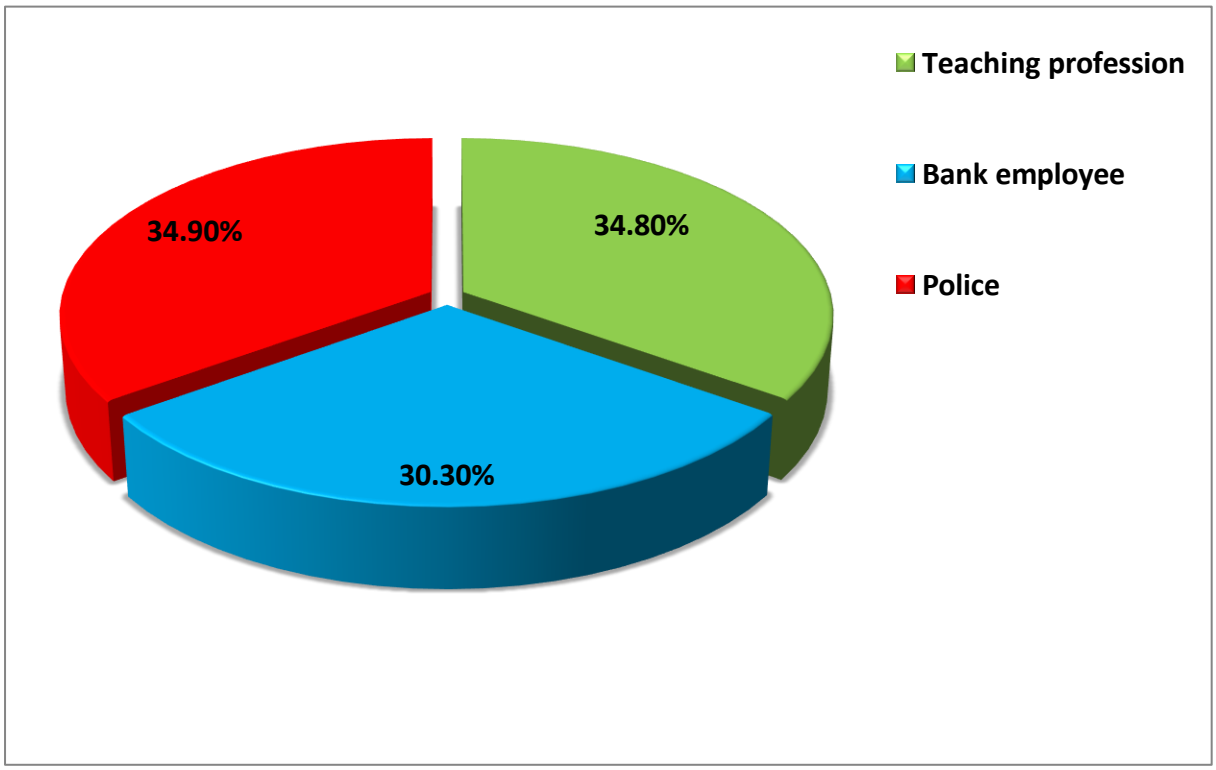

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Table no. 4: Residence-wise distribution of respondents.

Variables	**Categories**	**No. of respondents**	**Percentage**
Residence	**Urban**	**426**	**61.50**
	Rural	**267**	**38.50**

In our study, we observed that the majority of respondents 426 (61.5%) resided in urban areas and 267 (38.5%) resided in rural areas.

Figure no. 4: Residence-wise distribution of respondents.

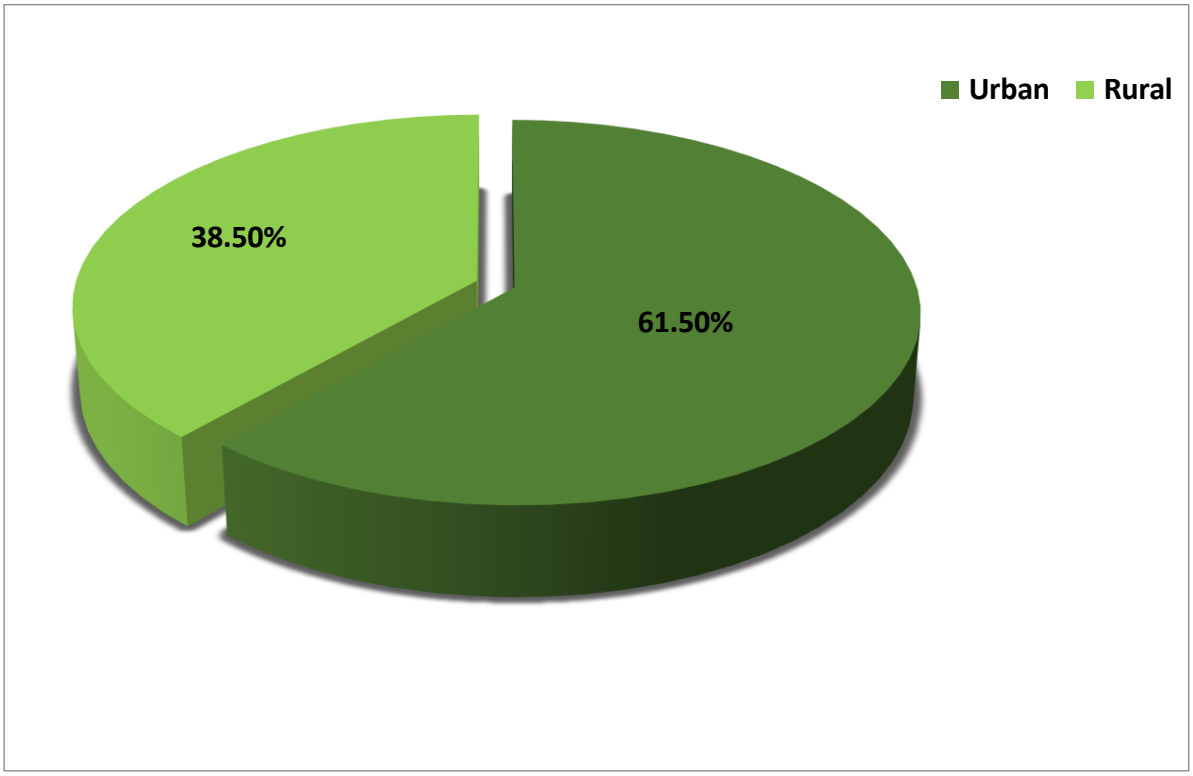

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Table no. 5: Marital status-wise distribution of respondents.

Variables	Categories	No. of respondents	Percentage
Marital status	Married	572	82.50
	Unmarried	121	17.50

In our study, we observed that the majority of respondents 572 (82.5%) were married and 121 (17.5%) respondents were unmarried.

Figure no. 5: Marital status-wise distribution of respondents.

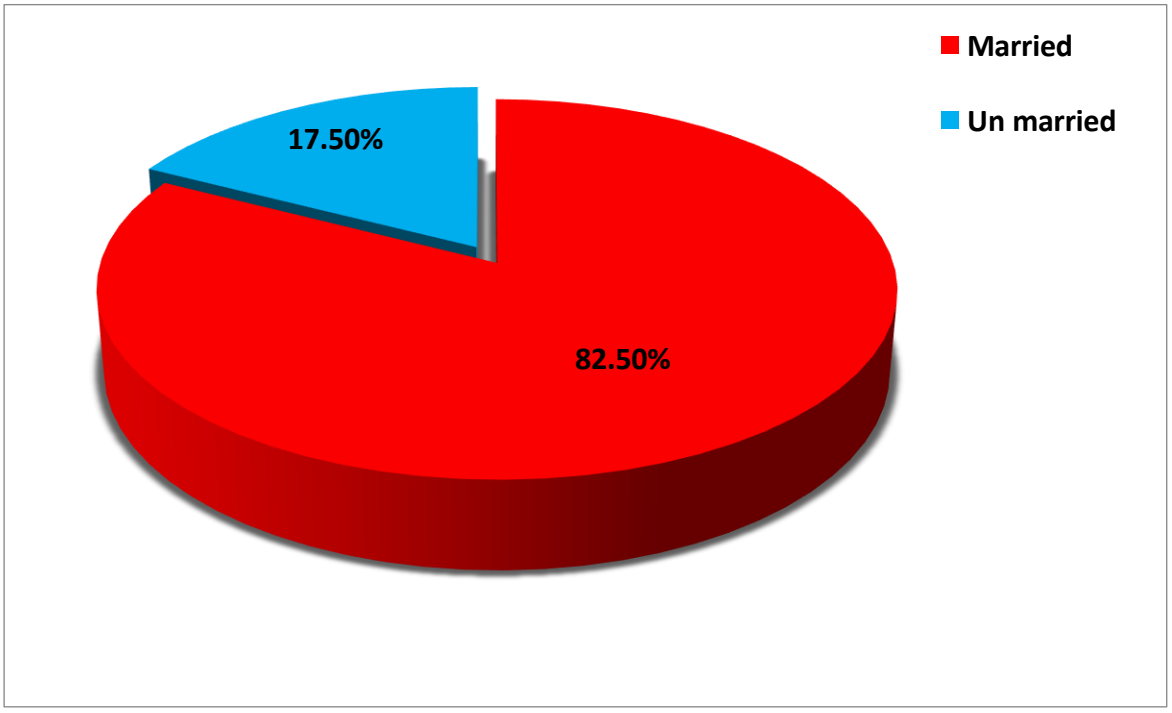

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Table no. 6: Work experience-wise distribution of respondents.

Work experience	No. of respondents	Percentage
0—5 years	209	30.20
6—10 years	184	25.60
11—15 years	127	18.30
16—20 years	104	15.00
21—25 years	44	6.30
>25 years	25	3.60
Total	**693**	**100.00**

In the present study out of 693 respondents, 209 (30.2%) respondents had work experience of 0-5 years, followed by 184 (25.6%) respondents had an experience of 6-10 years, and 127 (18.3%) respondents had work experience of 11-15 years,104(15.00%) respondents had 16-20years,44(6.30%) respondents had work experience of 21-25years,25(3.60%) respondents had greater than 25 years of experience.

Figure no. 6: Work experience-wise distribution of respondents.

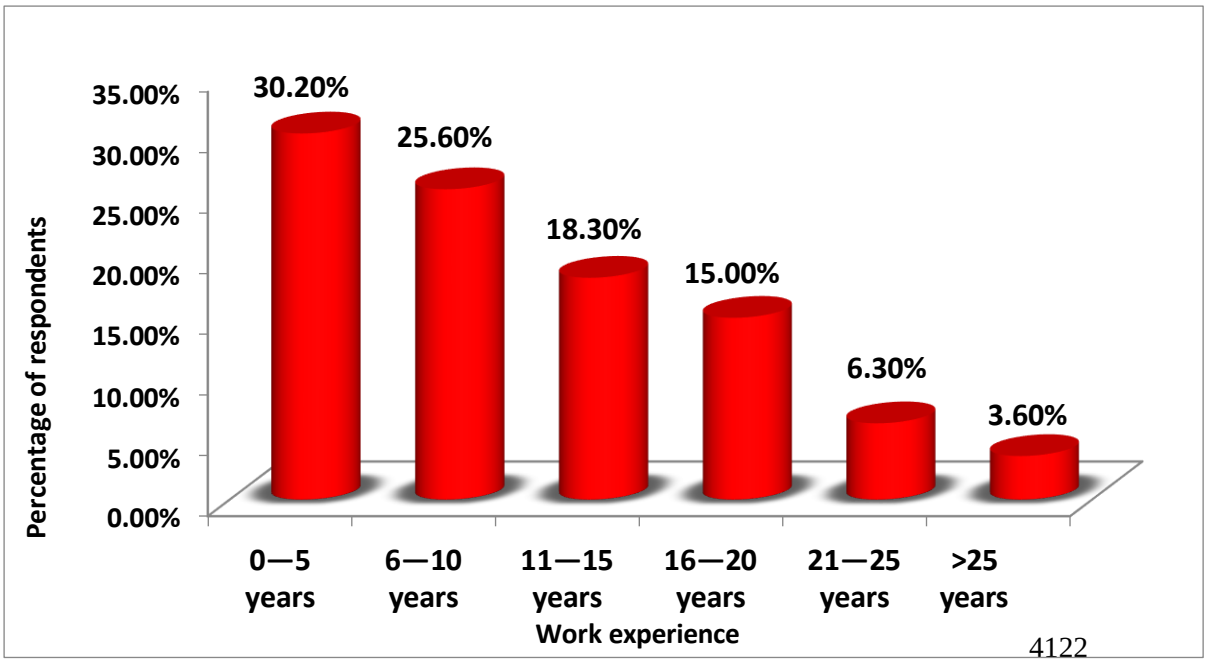

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Table no. 7: BMI-wise distribution of respondents.

BMI kg/m^2	Categories	No. of respondents	Percentage
< 18.5	**Underweight**	36	5.20
18.5–24.9	**Normal weight**	319	46.00
25.0—29.9	**Overweight**	260	37.50
30—34.9	**Obesity**	68	9.80
≥ 35	**Obesity Class-I**	10	1.50
Total	**---**	**693**	**100.00**

In the present study out of 693 respondents, 319 (46.0%) of the respondent's BMI was Normal (18.5-29.9). Followed by 260 (37.5%) respondents whose BMI was Overweight (25.0-29.9), 78 (11.3%) respondents whose BMI was Obesity and Obesity class-I, and 36 (5.2%) respondents were underweight (<18.5).

Figure no. 7: BMI-wise distribution of respondents.

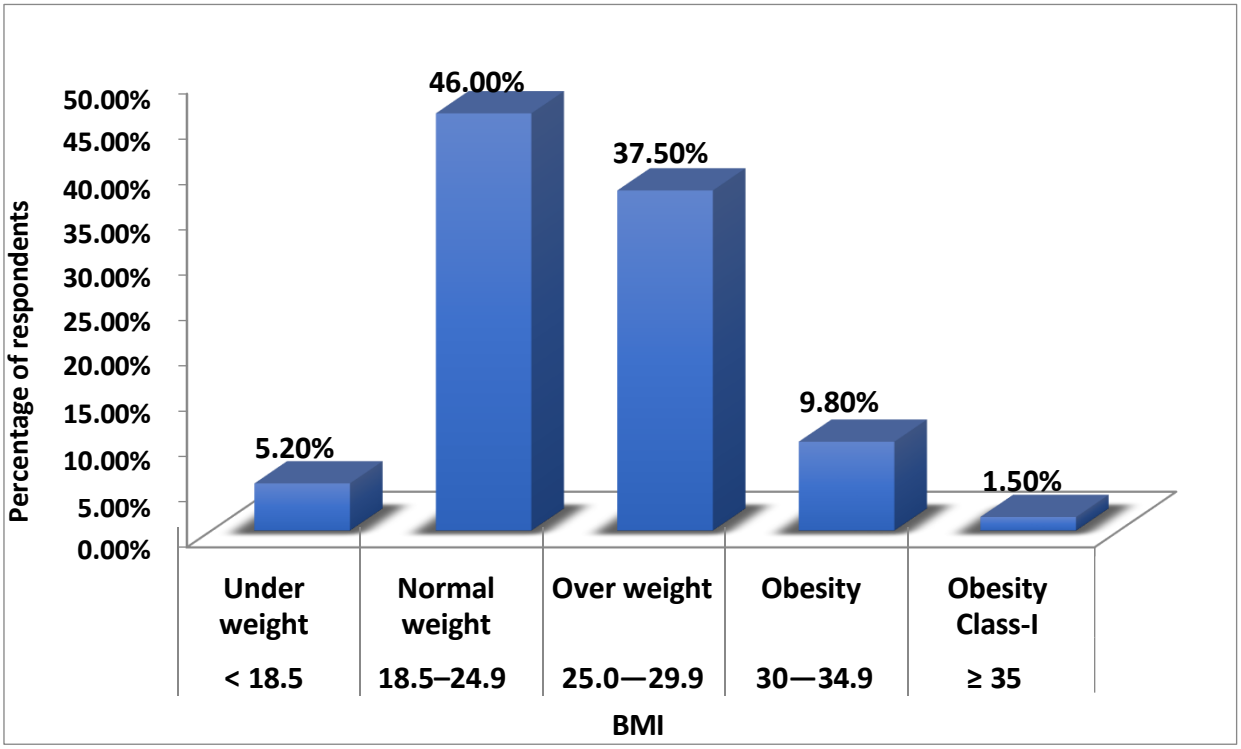

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Table no. 8: Risk assessment-wise distribution of respondents.

Risk assessment	No. of respondents	Percentage
0 (0.0%)	97	14.00
1 (10.0%)	182	26.30
2 (20.0%)	182	26.30
3 (30.0%)	120	17.30
4 (40.0%)	64	9.20
5 (50.0%)	34	4.90
6 (60.0%)	9	1.30
7 (70.0%)	5	0.70
8 (80.0%)	0	0.00
9 (90.0%)	0	0.00
10 (100.0%)	0	0.00
Total	**693**	**100.00**

The study observed that; 97 (14.0%) of respondents hadn't seen any risk factors of sudden cardiac arrest/sudden cardiac death (SCA/SCD), The majority of respondents 182 (26.3%) had observed risk factors of 1 and 2 respectively.

Figure no. 8: Risk assessment-wise distribution of respondents.

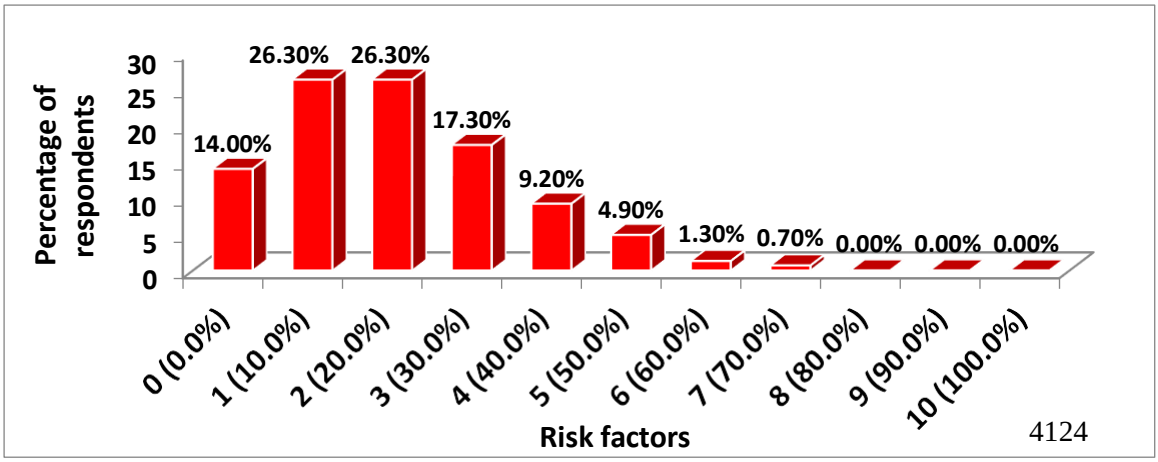

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Table no. 9: Risk factor-wise distribution of respondents.

Risk Factors	Total (N=693)	
	No. of respondents	percentage
HTN	52	7.50
DM	48	6.90
ALCOHOL	122	17.60
SMOKING	35	5.10
SLEEP	270	39.00
PHYSICAL INACTIVITY	286	41.30
OBESITY	78	11.30
COVID-19	130	18.80
DIET	328	47.30
STRESS	72	10.40

Figure no. 9: Risk factor-wise distribution of respondents.

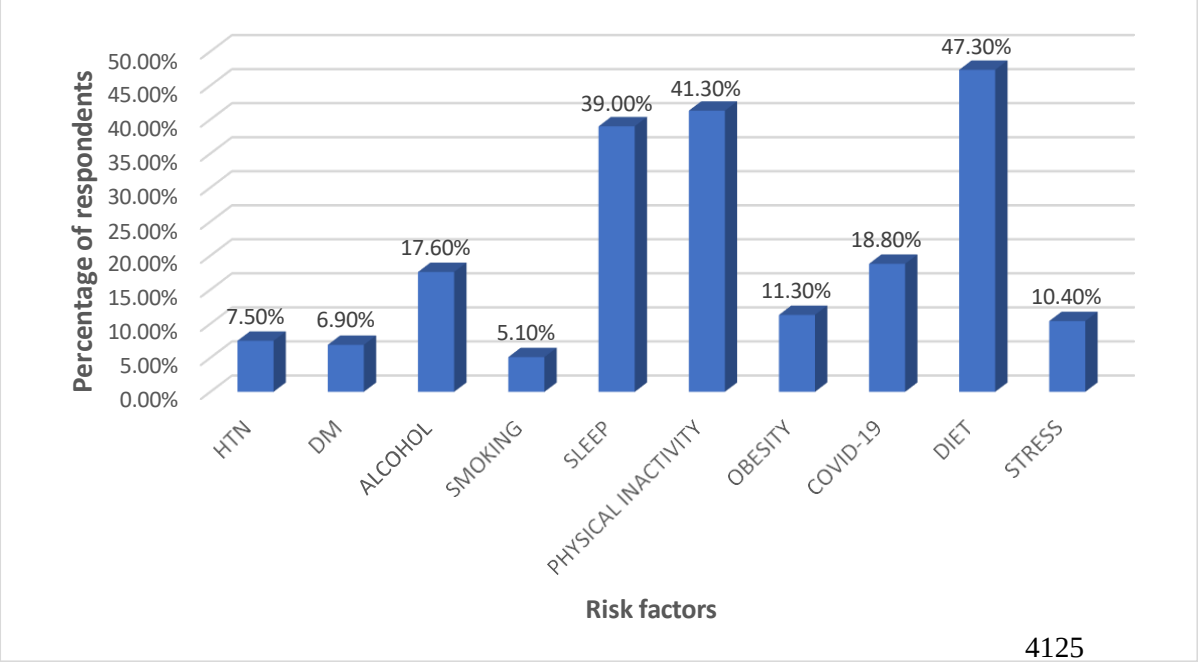

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Table no. 10: Stress-wise distribution of respondents.

PSS scale	Categories	No. of respondents	Percentage
0—13	**Low Stress**	103	14.90
14—26	**Moderate Stress**	518	74.70
27—40	**High Perceived Stress**	72	10.40
Total	**---**	**693**	**100.00**

In the present study out of 693 respondents; As per the PSS scale, the majority of respondents 518 (74.7%) had moderate stress. Followed by 103 (14.9%) of respondents who had seen low stress and 72 (10.4%) of respondents who had seen high perceived stress.

Figure no. 10: Stress-wise distribution of respondents.

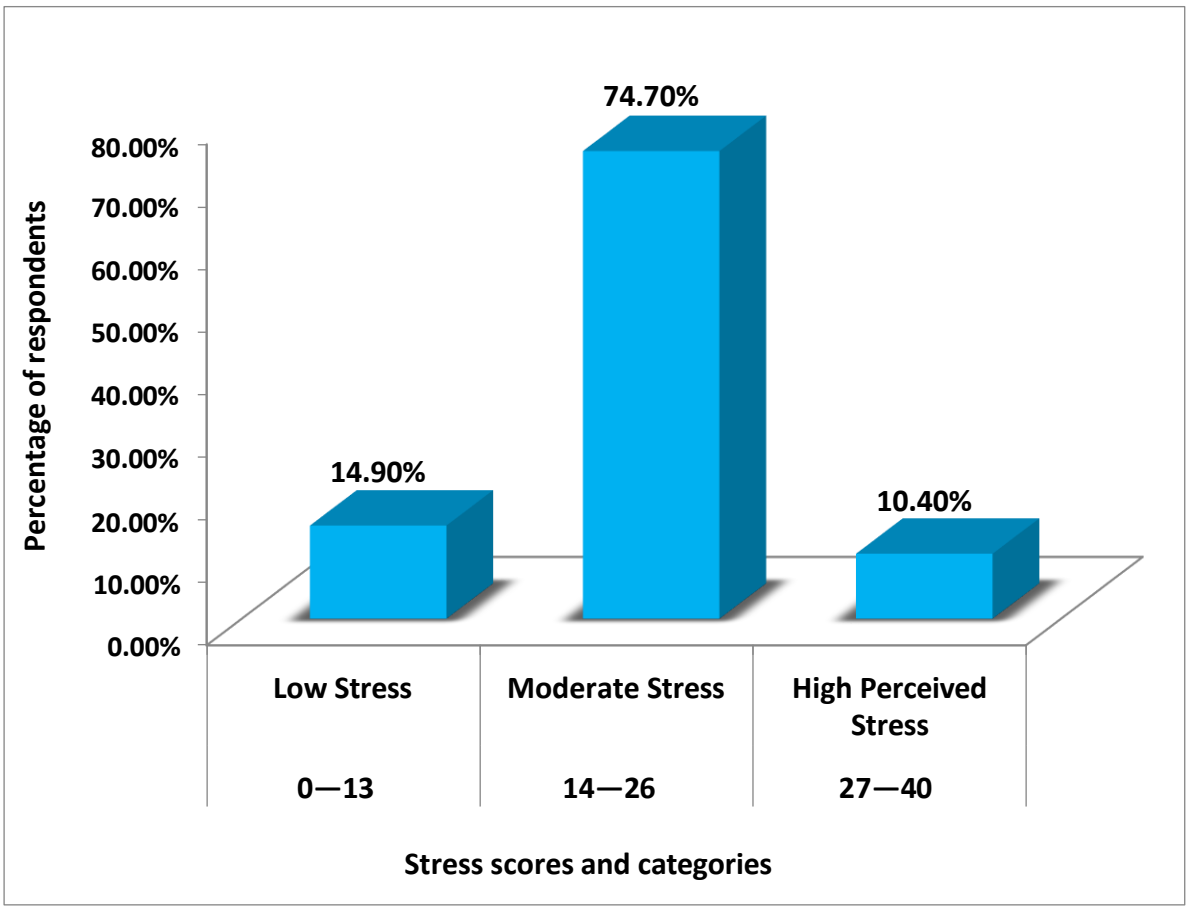

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Table no. 11: Pre-test knowledge scores-wise distribution.

Pre-test knowledge scores	Categories	No. of respondents	Percentage
<50%	**Poor**	276	39.80
50%--75%	**Moderately Good**	393	56.70
75%--100%	**Good**	24	3.50
Total	**---**	**693**	**100.00**
Mean ± SD	**10.11 ± 2.44 (50.55%)**		

The study reveals that; out of 693 respondents, in the pre-test majority of respondents 393 (56.0%) had observed moderately good knowledge of sudden cardiac arrest/sudden cardiac death (SCA/SCD), followed by 276 (39.8%) of respondents had observed poor knowledge on SCA/SCD and 24 (3.5%) of respondents had observed Good knowledge in the pre-test. The mean knowledge score in the pre-test was 10.11 (50.55%)

Figure no. 11: Pre-test knowledge scores-wise distribution.

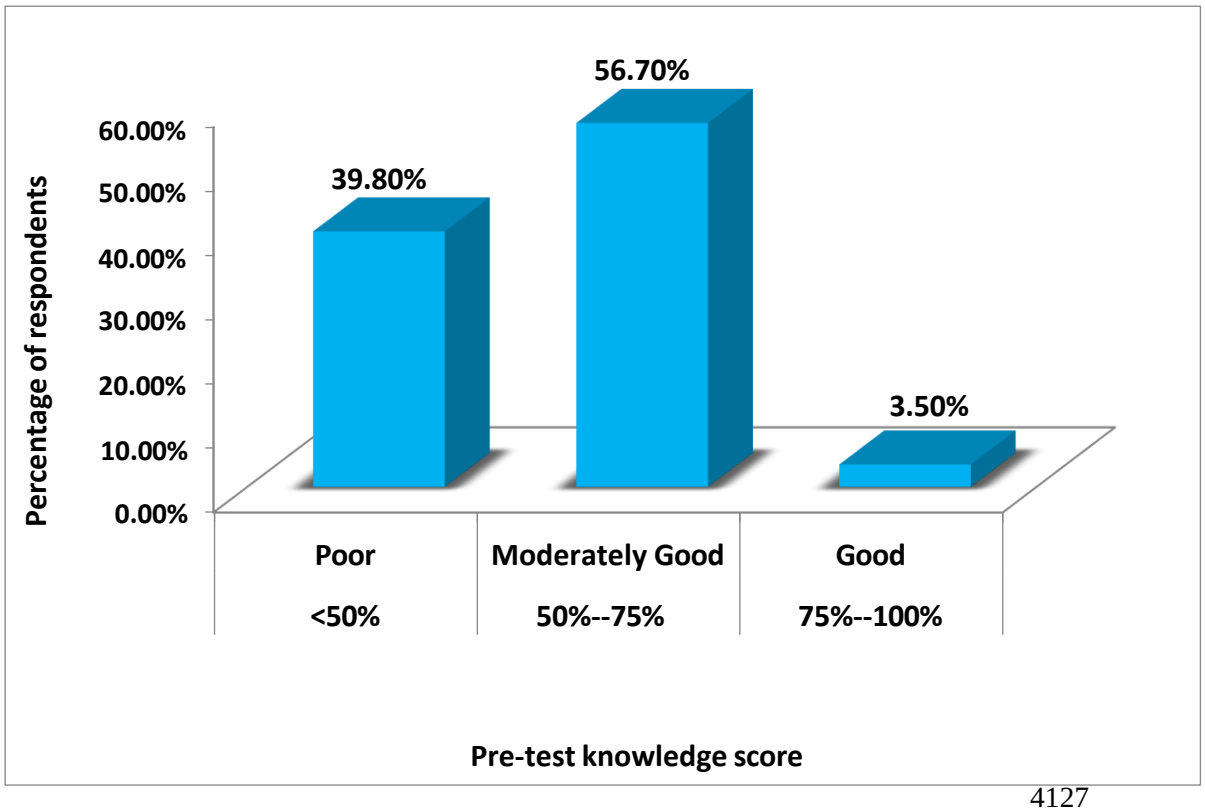

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Table no. 12: Post-test knowledge scores-wise distribution.

Post-test knowledge scores	Categories	No. of respondents	Percentage
<50%	**Poor**	7	1.00
50%--75%	**Moderately Good**	187	27.00
75%--100%	**Good**	499	72.00
Total	**---**	**693**	**100.00**
Mean ± SD	**15.83 ± 2.42 (79.15%)**		

The study reveals that; out of 693 respondents, in the post-test majority of respondents 499 (72.0%) had observed Good knowledge of sudden cardiac arrest/sudden cardiac death (SCA/SCD), followed by 187 (27.0%) of respondents had observed moderately good knowledge on SCA/SCD and only 7 (1.0%) of respondents had observed poor knowledge in the post-test. The mean score of knowledge score in the post-test was 15.83 (79.15%)

Figure no. 12: Post-test knowledge scores-wise distribution.

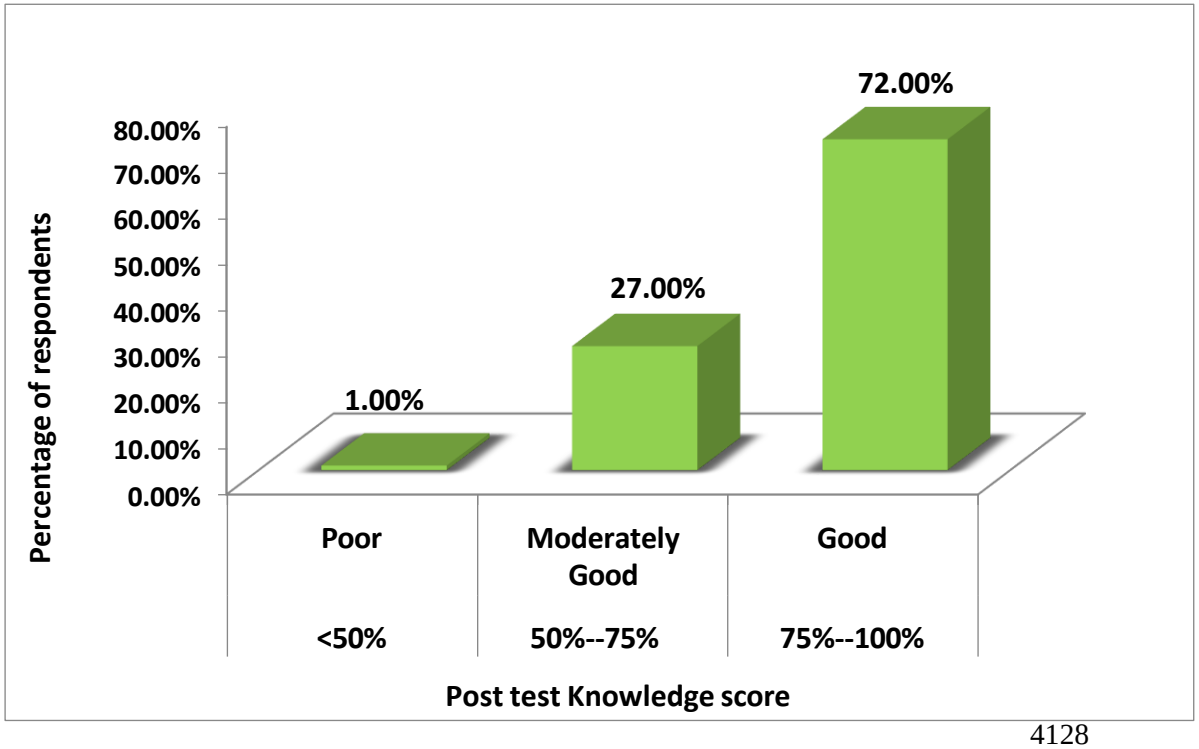

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Table no. 13: Comparison of knowledge scores between Pre and Post-test.

knowledge scores	Categories	Pre-test		Post-test	
		No. of respondents	Percentage	No. of respondents	Percentage
<50%	Poor	276	39.80	7	1.00
50%--75%	Moderately Good	393	56.70	187	27.00
75%--100%	Good	24	3.50	499	72.00
Total	---	693	100.00	693	100.00
Mean ± SD	----	10.11 ± 2.44		15.83 ± 2.42	
Diff. of mean	---	5.72 (28.6%)			
Paired t-test and p-value	t = 49.259, P = 0.0001, HS				

NS= not significant, S=significant, **HS=highly significant**

The study reveals that; there was a statistically highly significant mean difference in knowledge score between pre and post-test (P<0.001). The mean average difference in knowledge score from the pre-test to the post-test was 28.60%

Figure no. 13: Comparison of knowledge scores between Pre and Post-test.

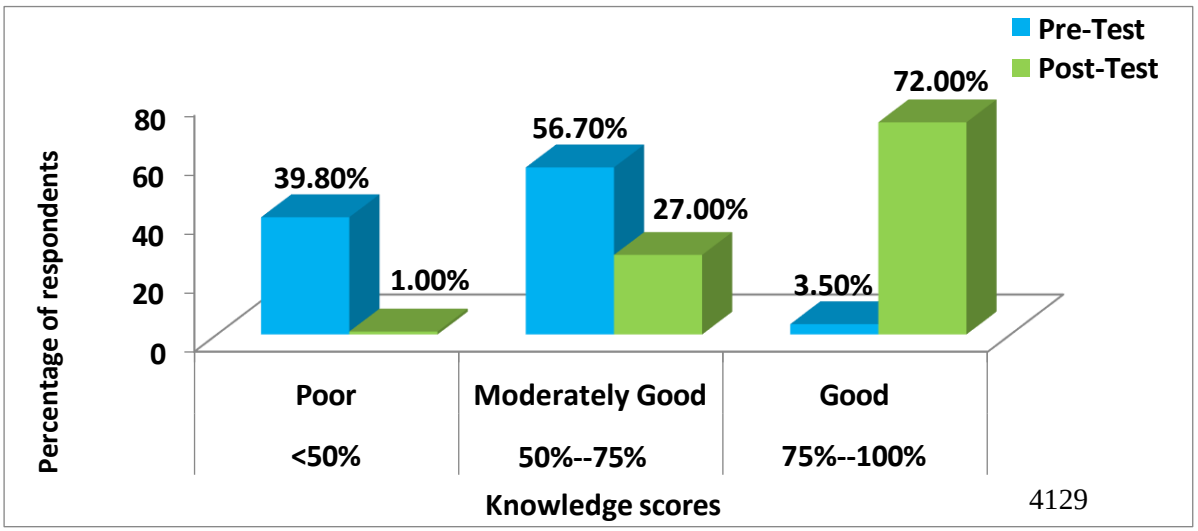

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Table no. 14: Comparison of mean knowledge scores between Pre and Post-test.

Knowledge scores	Pre-test mean score	Post-test mean score
Mean ± SD	10.11 ± 2.44	15.83 ± 2.42
Diff. of mean	5.72 (28.6%)	
Paired t-test and p-value	t = 49.259, P = 0.0001, HS	

NS= not significant, S=significant, **HS=highly significant**

The study reveals that there was a statistically highly significant mean difference in knowledge score between pre and post-test (P<0.001). The mean average difference in knowledge score from the pre-test to the post-test was 28.60%

Figure no. 14: Comparison of mean knowledge scores between Pre and Post-test.

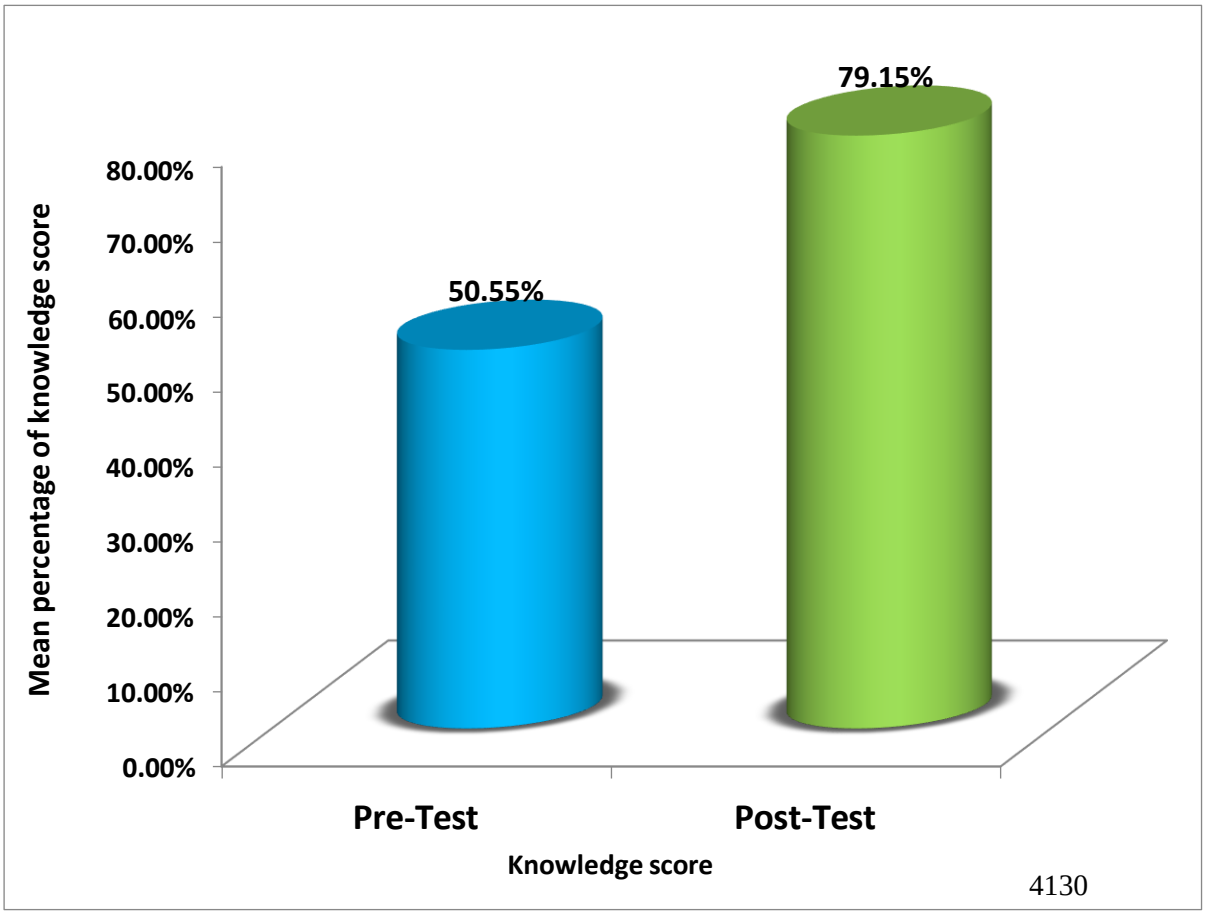

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Table no. 15: Comparison of pre-test and post-test knowledge scores with age.

Age in years	**No. of respondents**	**Pre-Test-knowledge score on SCA/SCD**		**ANOVA Test P-Value**	**Post-Test-knowledge score on SCA/SCD**		**ANOVA Test P-Value**
		Mean ± SD	**Mean %**		**Mean ± SD**	**Mean %**	
21-30	212	10.20 ± 2.40	51.00		15.99 ± 2.28	79.95	
31-40	291	10.37 ± 2.49	51.85	F = 6.035 P = 0.003, HS	15.76 ± 2.42	78.80	F = 0.702 P = 0.496, NS
41-50	190	9.60 ± 2.32	48.00		15.74 ± 2.56	78.70	
Total	693	**10.11 ± 2.44**	**50.55**		**15.83 ± 2.42**	**79.15**	

NS= not significant, S=significant, **HS=highly significant**

Pre-test:

The study observed that; the mean knowledge score of respondents on SCA/SCD in the pre-test in the age group of 21—30 years was 10.20 (51.0%), at the age group of 31—40 was 10.37 (51.85%), and at the age group of 41-50 years was 9.60 (48.0%). The mean knowledge was better in the age group of 21—40 years of respondents as compared to the age group of 41—50 years, this is a statistically highly significant difference in pre-test mean knowledge score with age ($P<0.01$)

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Post-test:

The study observed that; the mean knowledge score of respondents on SCA/SCD in the post-test in the age group of 21—30 years was 15.99 (79.95%), at the age group of 31—40 was 15.76 (51.85%), and at the age group of 41-50 years was 15.74 (78.70%). There was a statistically not significant difference in post-test mean knowledge score with age (P<0.01)

Figure no. 15: comparison of pre-test and post-test knowledge scores with age.

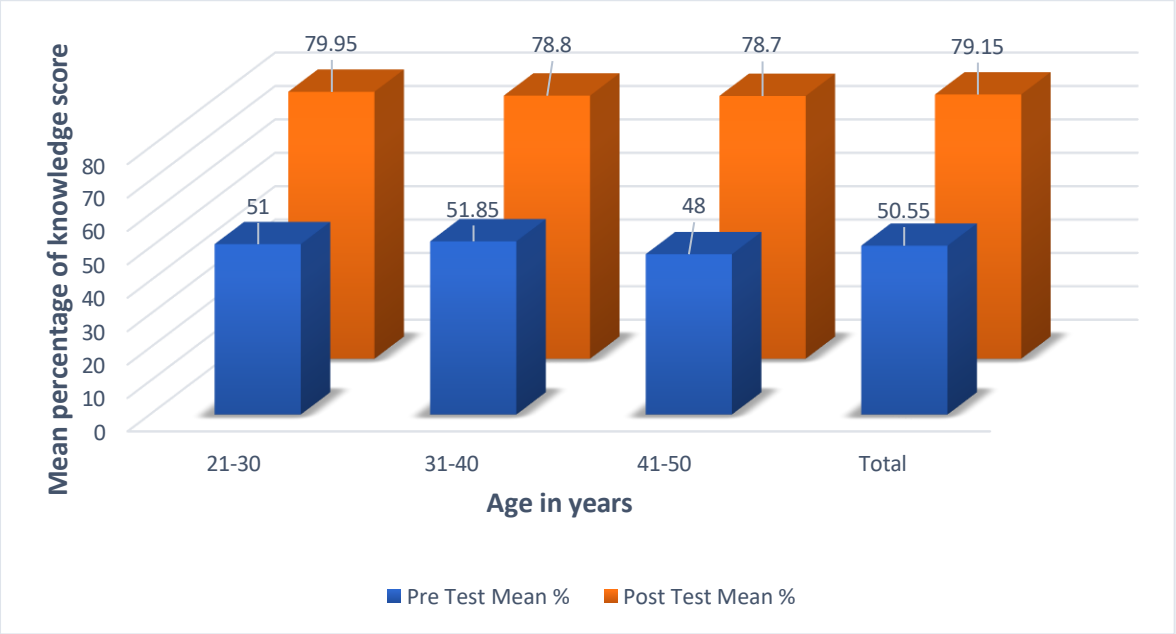

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Table no. 16: Comparison of pre-test and post-test knowledge scores with gender.

Categories	No. of Respondents	Pre-Test-knowledge score on SCA/SCD		Unpaired t-Test P-Value	Post-Test-knowledge score on SCA/SCD		Unpaired t-Test P-Value
		Mean ± SD	Mean %		Mean ± SD	Mean %	
Male	391	10.14 ± 2.53	50.70	t = 0.510 P = 0.610, NS	15.92 ± 2.58	79.60	t = 1.673 P = 0.093, NS
Female	302	10.05 ± 2.32	50.25		15.64 ± 2.45	78.20	

NS= not significant, S=significant, HS=highly significant

Pre-test:

The study reveals that; there was statistically no significant mean difference in pre-test knowledge score with gender (P>0.05)

Post-test:

The study reveals that; there was statistically no significant mean difference in post-test knowledge score with gender, (P>0.05)

Figure no. 16: Comparison of pre-test and post-test knowledge scores with gender.

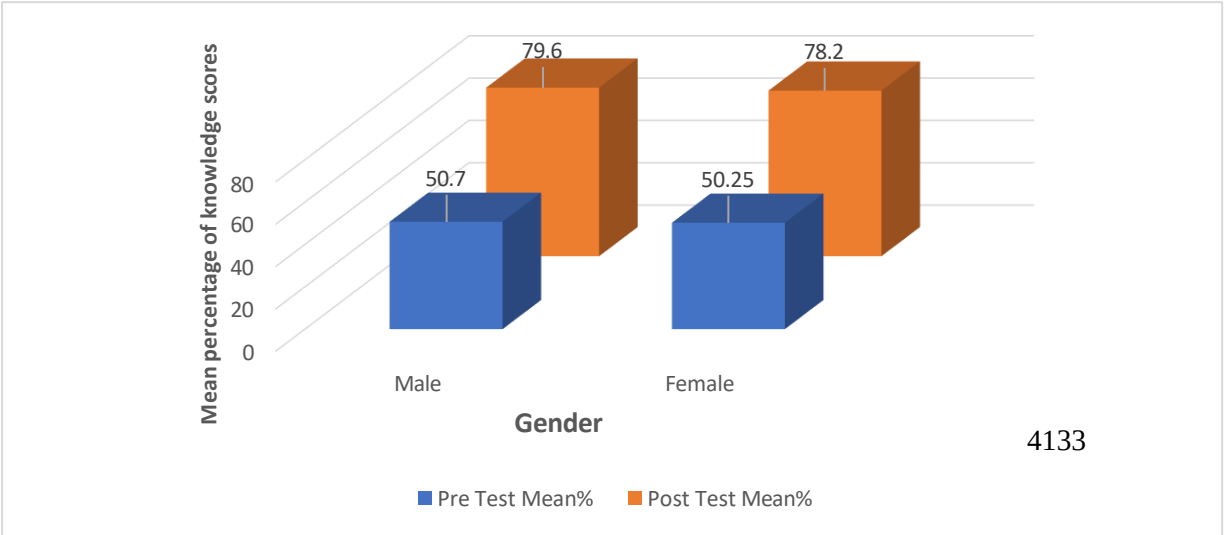

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Table no. 17: Comparison of pre-test and post-test knowledge scores with occupation.

Occupation	No. of respondents	Pre-Test knowledge score on SCA/SCD		ANOVA Test P-Value	Post-Test-knowledge score on SCA/SCD		ANOVA Test P-Value
		Mean ± SD	Mean %		Mean ± SD	Mean %	
Teaching profession	241	9.95 ± 2.34	49.75	F = 0.557 P = 0.573, NS	15.01 ± 2.34	75.05	F = 298.24 P = 0.0001, HS
Bank employee	210	10.15 ± 2.66	50.75		17.20 ± 2.66	86.00	
Police staff	242	10.20 ± 2.32	51.00		15.45 ± 2.32	77.25	
Total	**693**	**10.11 ± 2.44**	**50.55**		**15.83 ± 2.42**	**79.15**	

NS= not significant, S=significant, **HS=highly significant**

Pre-test:

The study observed that; the mean knowledge score of respondents on SCA/SCD in the pre-test teaching profession was 9.95, Bank employees was 10.15 and Police employees was 10.20. The mean knowledge score was a little bit better in police staff but statistically not significant difference in the pre-test mean knowledge score with occupation (P>0.05)

Post-test:

The study observed that; the mean knowledge score of respondents on SCA/SCD in the post-

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test teaching profession was 15.01, Bank employees was 17.20 and Police employees was 15.45. The mean knowledge score was significantly better in Bank employees as compared to police staff and teaching faculty this shows a statistically highly significant difference in post-test mean knowledge score with occupation (P<0.001)

Figure no. 17: Comparison of pre-test and post-test knowledge scores with occupation.

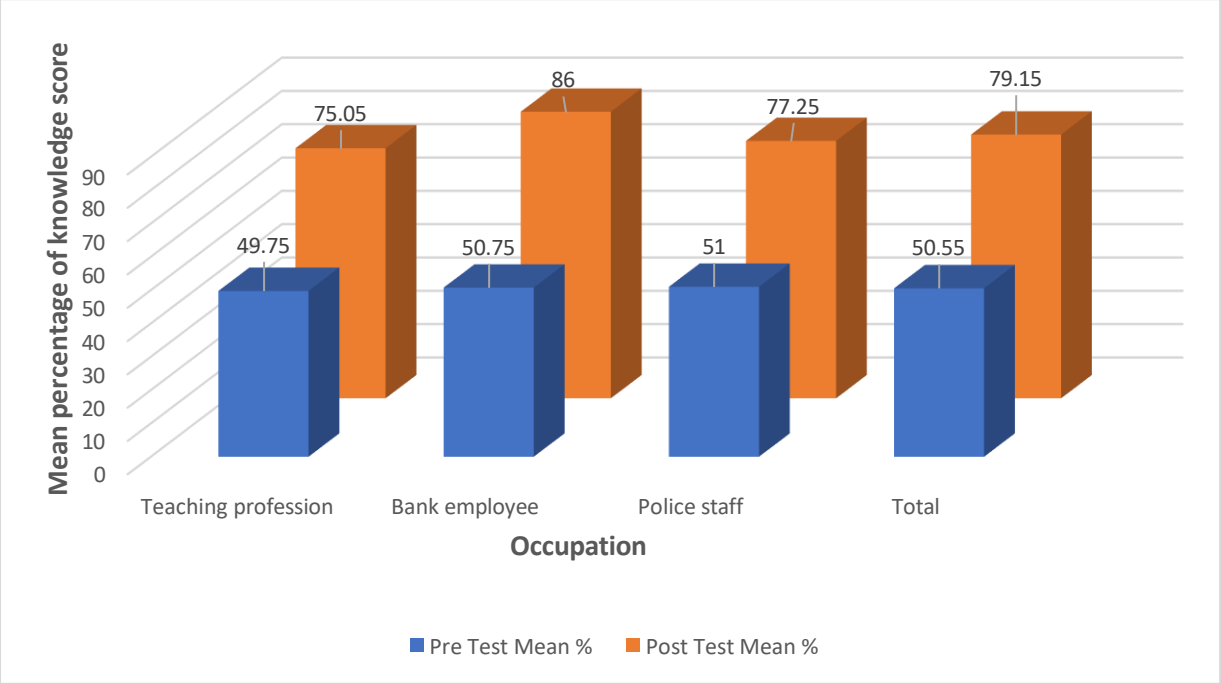

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Table no. 18: Comparison of mean risk factors with age.

Age in years	No. of respondents	Risk Factors		ANOVA Test P-Value
		Mean ± SD	Mean %	
21—30	212	1.78 ± 1.37	17.80	F = 9.393 P = 0.0001, HS
31—40	291	2.01 ± 1.39	20.10	
41—50	190	2.41 ± 1.66	24.10	
Total	693	**2.05 ± 1.48**	**50.55**	

NS= not significant, S=significant, **HS=highly significant**

The study observed that; the average risk factors of respondents in the age group of 21—30 years were 1.78 (17.8%), in the age group of 31—40 was 2.01 (20.1%), and in the age group of 41-50 years was 2.41 (24.1%). The average risk factors were lower in the age group of 21—30 years of respondents as compared to the age group of 31—40 years and 41—50 years, this is a statistically highly significant difference of average risk factors with age (P<0.001)

Figure no. 18: Comparison of mean risk factors with age.

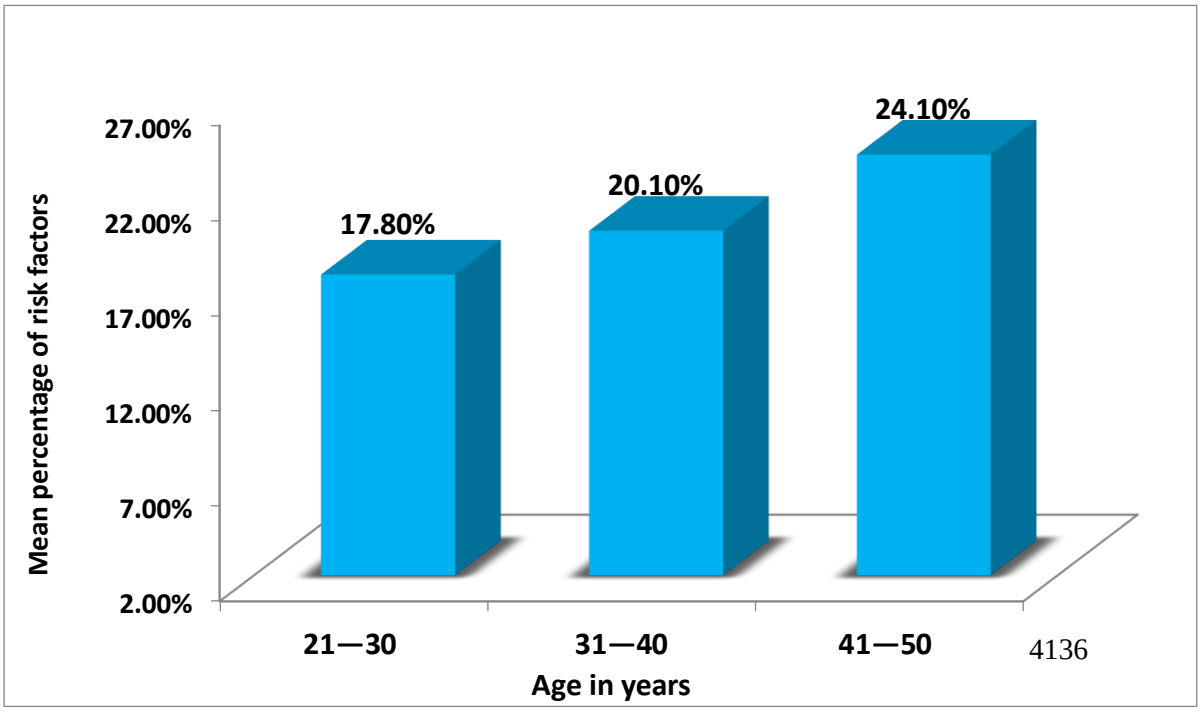

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Table no. 19: Comparison of mean risk factors with gender.

Variables	Categories	No. of Respondents	Risk Factors		Unpaired t-Test P-Value
			Mean ± SD	Mean %	
Gender	**Male**	391	2.48 ± 1.49	24.80	t = 9.211
	Female	302	1.49 ± 1.26	14.90	P = 0.0001, HS

NS= not significant, S=significant, **HS=highly significant**

The study reveals that; there was a statistically highly significant difference in mean risk factors with Gender (P<0.0001). Male respondents had significantly more mean risk factors as compared to females.

Figure no. 19: Comparison of mean risk factors with gender.

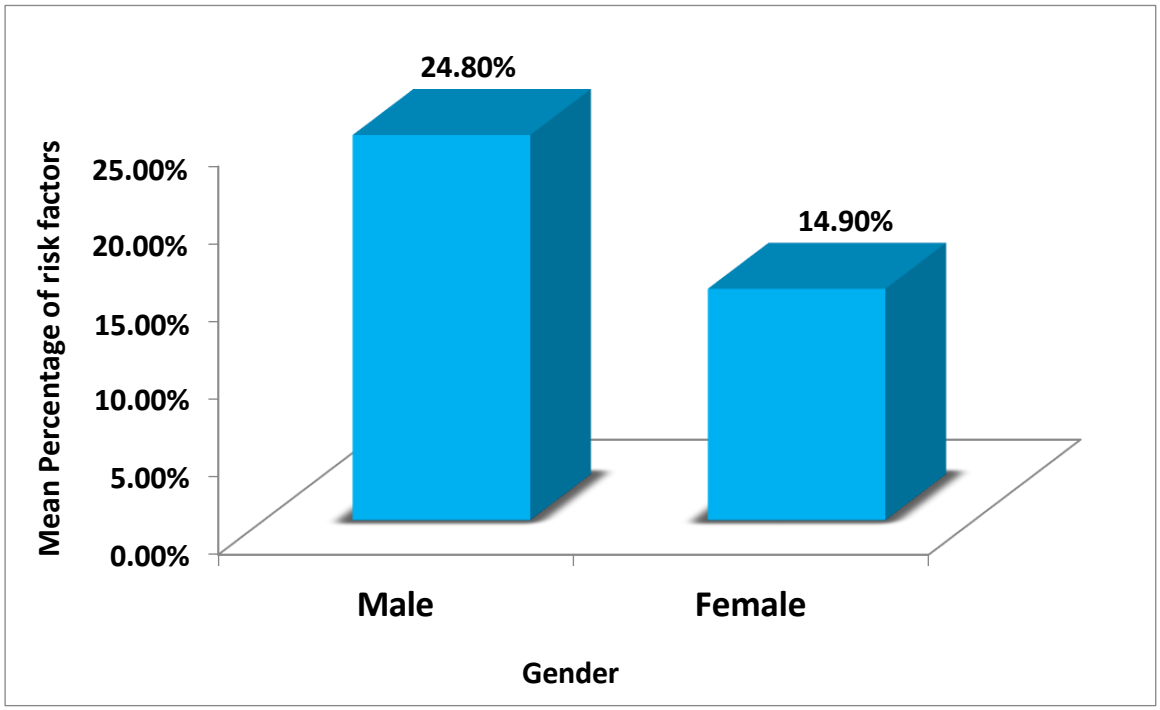

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Table No.20: Comparison of risk factors with age.

Risk Factors	21—30 (212)		31—40 (N=291)		41—50 (N=190)		Total (N=693)		P-value & Significance
	No.	%	No.	%	No.	%	No.	%	
HTN	4	1.90	13	4.50	35	18.40	52	7.50	P=0.001, HS
DM	0	0.00	11	3.80	37	19.50	48	6.90	P=0.001, HS
ALCOHOL	34	16.00	50	17.20	38	20.00	122	17.60	P=0.671, NS
SMOKING	9	4.20	14	4.80	12	6.30	35	5.10	P=0.650, NS
SLEEP	145	68.40	176	60.50	102	53.70	423	61.00	P=0.329, NS
PHYSICAL INACTIVITY	132	62.30	155	53.30	120	63.20	407	58.70	P=0.442, NS
OBESITY	16	7.50	35	12.00	27	14.20	78	11.30	P=0.147, NS
COVID-19	41	19.30	53	14.10	36	18.90	130	18.80	P=0.964, NS
DIET	107	50.50	132	36.80	89	46.80	328	47.30	P=0.792, NS
STRESS	20	9.40	26	8.90	26	13.70	72	10.40	P=0.292, NS

NS= not significant, S=significant, HS=highly significant

There was a statistically highly significant difference in the distribution of risk factors of HTN and DM with the age of respondents ($P<0.001$).

Whereas there was a statistically not significant difference in the distribution of risk factors of Alcohol, Smoking, Sleep, physical activity, Obesity, COVID-19, Diet, and Stress with age of respondents ($P>0.05$)

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Fig No.20: Comparison of risk factors with age.

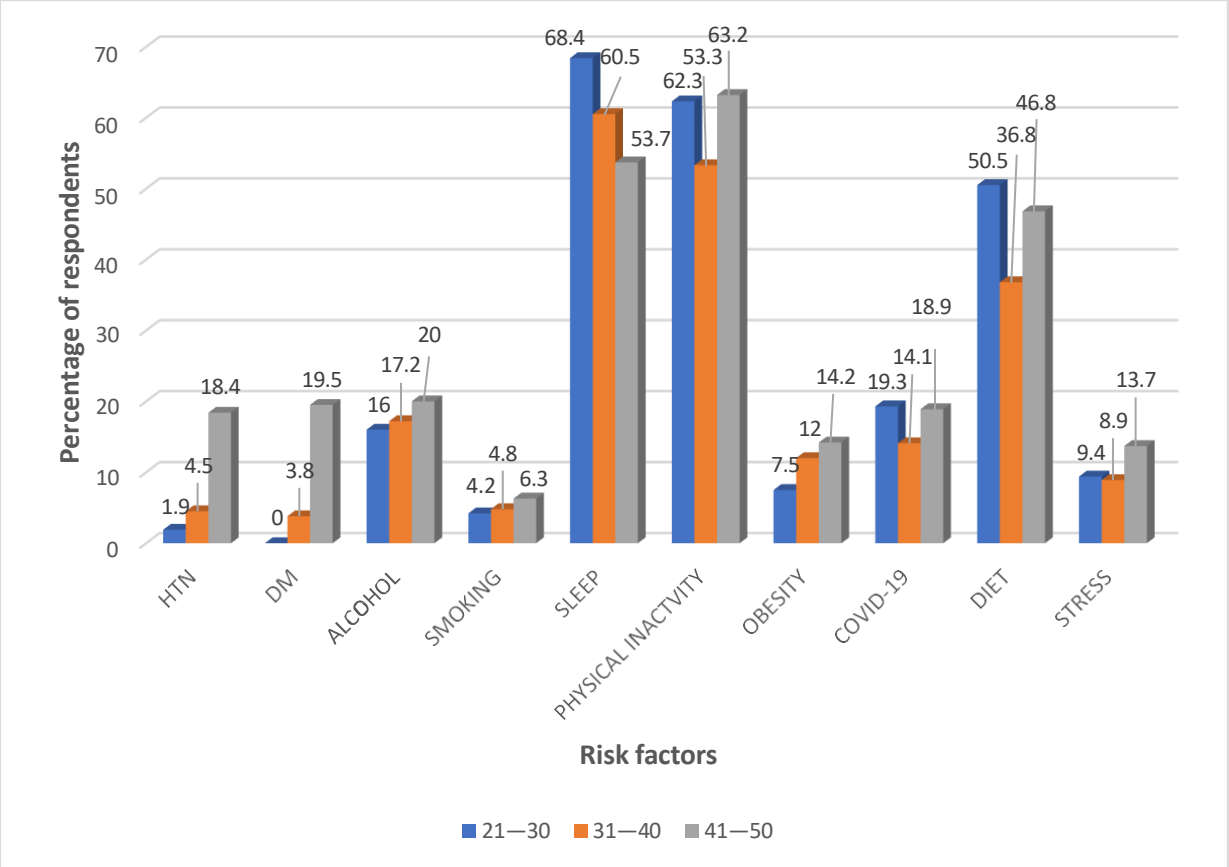

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Table No.21: Comparison of risk factors with gender.

Risk Factors	Males (N=391)		Females (N=302)		Total (N=693)		P-value & Significance
	No.	%	No.	%	No.	%	
HTN	34	8.70	18	6.00	52	7.50	P=0.208, NS
DM	33	8.40	15	5.00	48	6.90	P=0.095, NS
ALCOHOL	119	30.40	3	1.00	122	17.60	P=0.0001, HS
SMOKING	35	9.00	0	0.00	35	5.10	P=0.0001, HS
SLEEP	228	58.30	195	64.60	423	61.00	P=0.411, NS
PHYSICAL INACTIVITY	221	56.60	186	61.60	407	58.70	P=0.494, NS
OBESITY	45	11.50	33	10.90	78	11.30	P=0.831, NS
COVID-19	94	24.00	36	11.90	130	18.80	P=0.0001, HS
DIET	236	60.40	92	30.50	328	47.30	P=0.0001, HS
STRESS	41	10.50	31	10.30	72	10.40	P=0.932, NS

NS= not significant, S=significant, HS=highly significant

There was a statistically highly significant difference in the distribution of risk factors of Alcohol, smoking, COVID-19, and Diet with the gender of respondents ($P<0.05$). Whereas there was a statistically not significant difference in the distribution of risk factors of HTN, DM, Sleep, Physical Activity, Obesity, and Stress with the gender of respondents ($P>0.05$)

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Fig.No.21: Comparison of risk factors with gender.

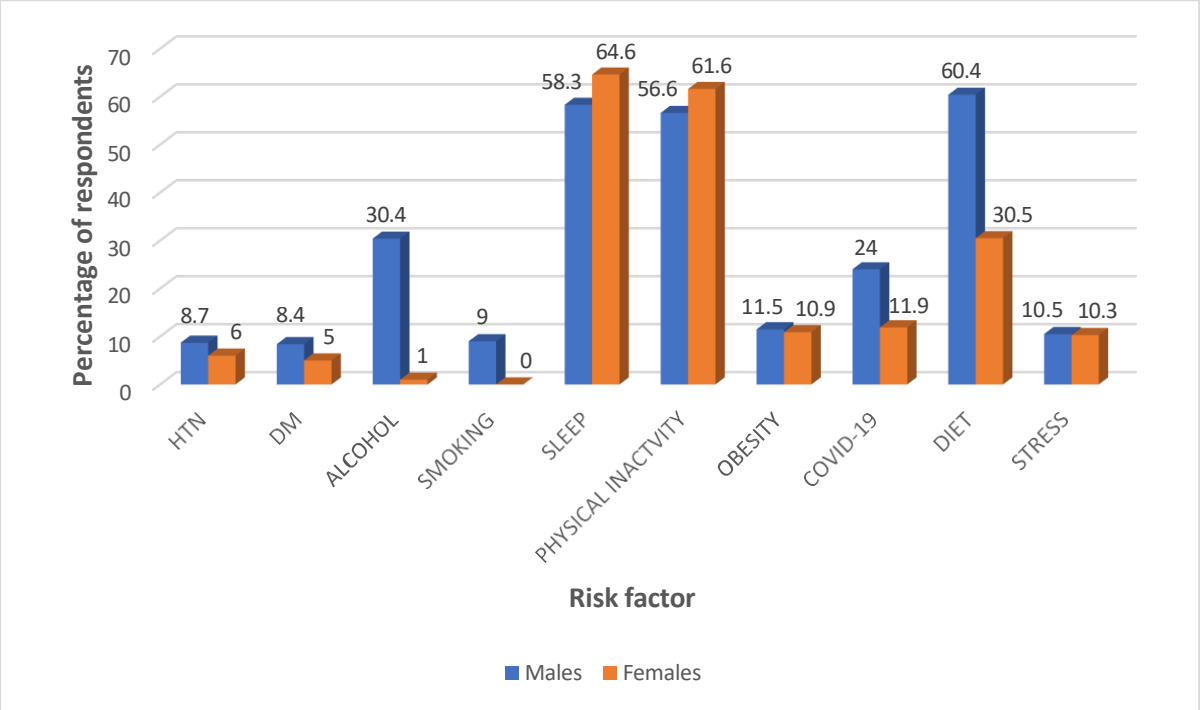

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Table no. 22: Comparison of risk factors with occupation.

Risk Factors	Teaching Profession (241)		Bank Employee (N=210)		Police Staff (N=242)		Total (N=693)		P-value & Significance
	No.	%	No.	%	No.	%	No.	%	
HTN	11	4.60	18	8.60	23	44.30	52	7.50	P=0.127, NS
DM	9	3.70	22	10.50	17	7.00	48	6.90	P=0.032, S
ALCOHOL	1	0.40	65	31.00	56	23.10	122	17.60	P=0.0001, HS
SMOKING	0	0.00	21	10.00	14	5.80	35	5.10	P=0.0001, HS
SLEEP	82	34.00	63	30.00	125	51.60	270	39.00	P=0.003, HS
PHYSICAL INACTIVITY	80	33.20	113	53.80	93	38.40	286	41.30	P=0.014, S
OBESITY	27	11.20	20	9.50	31	12.80	78	11.30	P=0.615, NS
COVID-19	19	7.90	59	28.10	52	21.50	130	18.80	P=0.0001, HS
DIET	63	26.10	114	54.30	151	62.40	328	47.30	P=0.0001, HS
STRESS	9	3.70	29	13.80	34	14.00	72	10.40	P=0.001, HS

NS= not significant, S=significant, HS=highly significant

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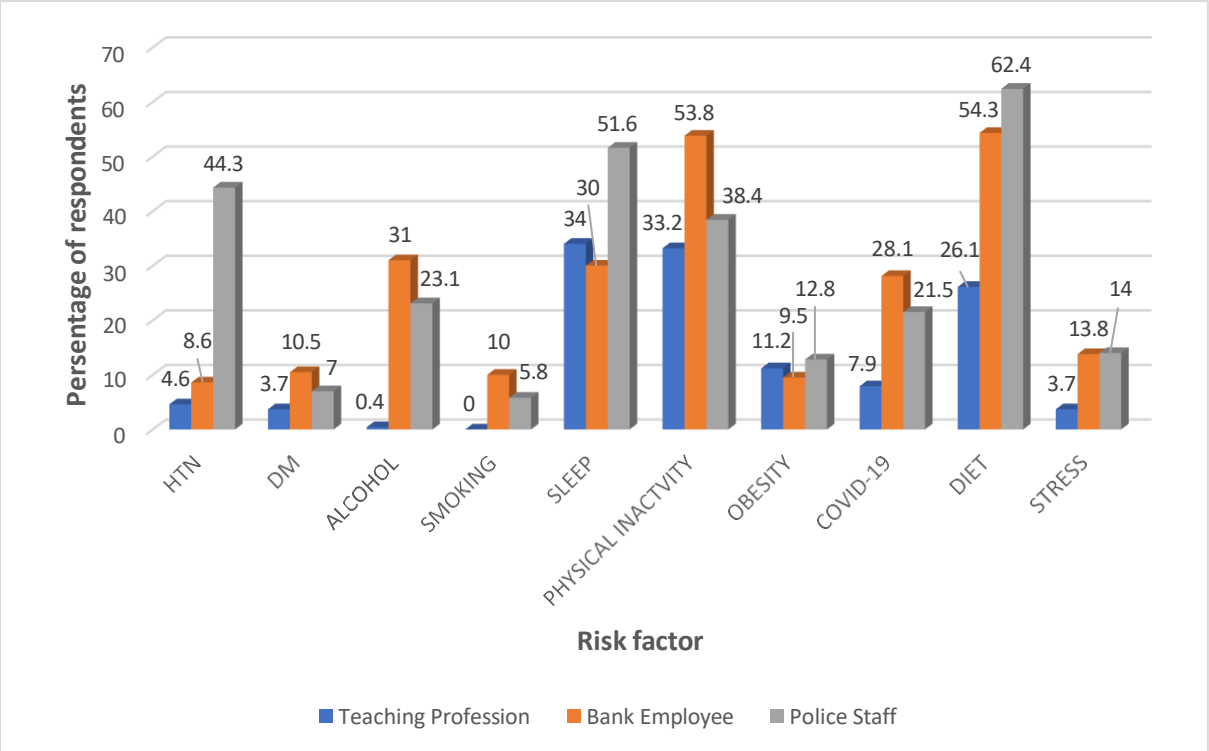
There was also a statistically highly significant difference in the distribution of risk factors of alcohol, smoking, sleep, COVID-19, diet, and stress with occupation of respondents (P<0.001).

There was a statistically significant difference in the distribution of risk factors of DM, and physical activity with the occupation of respondents (P<0.05).

Whereas there was a statistically not significant difference in the distribution of risk factors of HTN and obesity with the occupation of respondents (P>0.05)

Figure no. 22: Comparison of risk factors with occupation.



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Statistical data analysis:

Statistical data was analyzed by IBM SPSS 20.0 version software. Collected data were spread on an Excel sheet and prepared a master chart. Through the master chart tables and graphs were constructed. For quantitative data analysis mean and standard deviations were calculated and paired and un-paired t-tests, ANOVA tests, and correlation tests were applied for statistical significance. For qualitative data analysis, the chi-square test and Fisher exact probability tests were applied for statistical significance.

The P-value less than 0.05 was considered significant.

DISCUSSION:

SCA and SCD are one of the major causes of death among young adults. In recent decades, the incidence is slightly shifting towards the younger generation due to rising risk factors in the global scenario due to modern lifestyle and rapid shift towards Western culture. The lack of knowledge about the disease and its management has increased the burden. Hence, we aim to analyze the prevalence of risk factor and to assess and improve the knowledge of respondents regarding SCA/ SCD based on self-designed knowledge assessment questionnaires and risk assessment questionnaires among various service sectors and help them to understand the management of risk factors.

A total of 693 respondents were enrolled in the study criteria after obtaining written consent.

In our study we observed that the maximum number of respondents

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291(42.00%) belonged to the age group of 31-40 years, followed by 212(30.60%) belonged to the age group of 21-30 years, and 190(27.40%) belonged to the age group of 41-50 years. The minimum age of respondents was 21 years, and the maximum age of respondents was 50 years. The mean age stood at 36.91. Our study results were similar to the study conducted by Andrew C T et al. [3]

In our study, we observed that 391(56.40%) respondents were males, and 302(43.60%) respondents were females. The male-to-female ratio was 1.3:1. Our study results were similar to the study conducted by Andrew C T et al. [3]

In our study we observed that 382(47.30%) had mixed diet, followed by 286(41.30%) had no physical activity, 270(39.00%) had inadequate sleep, 130(18.80%) had suffered previously covid 19, 122(17.60%) consumes alcohol, 78(11.30%) had obesity, 72(10.40%) had high perceived stress, 52(7.50%) had HTN, 48(6.90%) had DM, 35(5.10%) are regular smokers. These findings were similar to the study conducted by Dian S A et al. [4]

In our study we observed that the majority of the respondents 518(74.70%) had moderate stress, followed by 103(14.90%) respondents who had low stress, and 72(10.40%) respondents who had high stress. A similar result was shown in the study conducted by Pangtey R et al. [30]

The pre-test was conducted to assess the knowledge regarding SCA and SCD

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among young adults. The study findings revealed that the majority of respondents 393(56.00%) had moderately good knowledge, followed by 276(39.80%) respondents who had poor knowledge, and 24(3.50%) respondents had good knowledge in the pre-test.

Later, the post-test results were assessed, the majority of respondents 499(72.00%) had observed good knowledge of SCA and SCD, followed by 187(27.00%) had observed moderately good knowledge, and only 7(1.00%) had observed poor knowledge. The mean knowledge in the post-test.

The mean knowledge score in the pre-test was 10.11(50.55%) and the mean knowledge score in the post-test was 15.83(79.15%). We observed that there was a statistically highly significant mean difference in knowledge scores from the pre-test to the post-test ($P<0.001$). The mean average difference in knowledge scores from the pre-test to the post-test was 28.60%. These above findings are similar to Kerketta CS et al. [31]

Healthcare professionals like, clinical pharmacist who is knowledgeable about the risk factors of SCA and SCD will be better able to educate the public.

CONCLUSION:

In the present study, the results revealed that the prevalence of risk factors of SCA/SCD is high, but respondents were not aware of them. The majority of respondents have been observed to have increased incidences of unhealthy lifestyles such as mixed diet, physical inactivity, inadequate sleep, and alcohol consumption.

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Our study results revealed that there was a lack of knowledge about SCA/SCD among young adults. It is important to educate young adults regarding the signs and symptoms, risk factors, and management of SCA/ SCD. Hence pharmacist intervention is important in improving knowledge regarding the management of risk factors among young adults, it can be done by providing education about lifestyle modification such as healthy diet intake, maintaining adequate sleep and physical activity, avoiding smoking and alcohol consumption, and managing stress. Having this knowledge helps them in the prevention of SCA/ SCD. Education regarding SCA/ SCD should be given by health care professionals, training programs by organizations, government programs & and other mass media in a correct manner.

The study showed that the respondents among selected service sectors have been observed with increased risk factors such as unhealthy diet, inadequate sleep, alcohol consumption, and physical inactivity. It is interesting to know that the risk factors among the police are observed to be more as compared to the bank employees and teachers.

Our study results revealed that the knowledge regarding SCA/ SCD was initially low and increased drastically after the pharmacist's intervention.

As there is a significant shift of SCA/ SCD from elderly to young adults. Initial management can result in preventing the early chances of SCA/ SCD. Respondents have become aware by answering the knowledge-based questionnaire regarding SCA/ SCD.

We conclude that targeting young adults in the selected service sectors and educating them with precise knowledge can lead to a positive impact on

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society. Hence our education program helped the respondents acquire proper knowledge, understanding, management, and prevention of SCA/ SCD.

Limitations and Future Scope:

The study was conducted with a limited number of respondents as we had six months of duration. This study can be extended even to a larger population for the screening of risk factors and early prevention of SCA and SCD. The clinical pharmacist can play a vital role in this regard. Such studies help develop a better public information system which is essential for the wellbeing of society.

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