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Awareness of Atherosclerosis and Cardiovascular Events Among Undergraduate Healthcare Professionals

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Abstract

The word atherosclerosis consists of two parts: atherosis (accumulation of fats accompanied by several macrophages) and sclerosis (fibrosis layer comprising smooth muscle cells. The presence of hyperlipaemia is the major risk issue factor for coronary artery disease. In 2016 advances in atherosclerosis research were focused on the discovery and validation of newly targeted genetics and mechanistic connection to atherothrombotic heart diseases. The Survey on awareness about the risk factors and complications of liver cirrhosis among college students was conducted using a Google form link. We have distributed our survey among 100 college students. Pie charts and Bar diagrams were used to represent output variables. Results showed that the knowledge of cardiovascular 54.00 % said No and 46.00 % said yes. Stroke caused due to lack of blood supply to 44.00 % said heart, 50.00 % said brain, and 6.00 % said I don't know. These findings conclude that the majority of the population is unaware of the risk factors such as obesity, LDL, and family history, which lead to the development of atherosclerosis, but only a few populations are aware of stress, smoking, coronary heart attack, cholesterol, sleep apnea, HDL, work pressure, physical activity, heart disease, and coronary disease that leads to atherosclerosis.

Keywords: *Atherosclerosis, Cardiovascular Disease, Cholesterol, High Blood Pressure, Novel Technique, Physical Activity.*

Introduction

Atherosclerosis mainly originates from the Greek word meaning thickening of the intimal layer of arteries accumulation of fat. As we know, fatty materials are mainly located in the central core of the plaque and covered by a fibrous cap**.** Atherosclerosis leads to hyperlipidemia and lipid oxidation which play a major cause in mortality in developing countries. It is mainly a disease of vascular intima. The word atherosclerosis consists of two parts: atherosis (accumulation of fats accompanied by several macrophages) and sclerosis (fibrosis layer comprising smooth muscle cells [SMC], which consist of leukocyte and connective tissue [1]. Arteries and blood vessels help to carry oxygen-rich blood from the heart and different parts of our body. It is the main cause of death in the Western world. The main risk issue pertains to stability in aged individuals, particularly men, and those with a history of premature coronary cardiovascular disease (CVD). Most men are at greater risk than women, due to the presence of natural estrogen in the body. The presence

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of hyperlipaemia is the major risk issue factor for coronary artery disease. In 2016 advances in atherosclerosis research were focused on the discovery and validation of newly targeted genetics and mechanistic connection to atherothrombotic heart diseases [2-4]. Atherosclerosis is mainly a subject which is associated with cardiologists and general medical doctors [5]. An estimated 16.7 million, or 29.2 % of total deaths all over the worldwide result from various forms of CVDs, major primary risk factors such as unhealthy diet, physical inactivity and smoking [6]. Mainly fatty streaks evolve into fibrous plaques, some of which develop into the form of vulnerability to rupture, causing thrombosis or stenosis. Plaque mainly developed in the same regardless of race, sex or geographic location, genetic predisposition [7]. During progression of atherosclerosis myeloid cells destabilize lipid-rich plaque which leads to arterial walls and causes rupture to myocardial infarction and stroke [8]. Fibrous plaque mainly appeared at the age of 40 years.

Previous studies done on LDL in T2D plaque is associated with cardiovascular events [9], nonalcoholic fatty liver disease leads to cardiovascular events [10], cardiovascular safety of mometasone and once-daily fixed-dose [11], atherosclerosis leads to process, indicators, risk factors and new hopes [1] advances in new therapeutic targets [12], pathology of atherosclerosis plaque development and plaque responses to medical treatment [7, 13, 14]. The current study aimed to create awareness of atherosclerosis and cardiovascular events among healthcare professionals.

Materials and Methods

The number of participants involved in this study was 100 college students. We used a simple random sampling method. In this current study, the questionnaires were prepared and circulated among 100 college students through Google Forms link.

Study Design and Data Collection

For data collection, we used self-structured questionnaires. We used an online Google form link as data collection software. We used an online Google form link as data collection software. The list of output variables is demographic information about awareness of atherosclerosis and cardiovascular events among undergraduate healthcare professionals. Pie charts and Bar diagrams were used to represent output variables.

Results

Figure 1 shows the gender of the students 81.00 % is male and 19.00 % are female. Figure 2 represents age group of students like 4 % belong to age group 18, 7 % belong to age group 19, 17 % belong to age group 20, 25 % belong to age group 21, 21 % belong to age group 22, 15 % belong to age group 23, 10 % belong to age group 24, 1 % belong to age group 25. Results on the students' knowledge about atherosclerosis are depicted in Figure 3 and the results showed 92.00 % said Yes and 8.00 % said No. Figure 4 represents the knowledge of cardiovascular 54.00 % said No and 46.00 % said yes. Results on the awareness of different types of atherosclerosis 71.00 % agreed yes and 29.00 % were still not aware as depicted in Figure 5. Figure 6 illustrates coronary artery diseases, 62.00 % said Yes and 38.00 % said No. Results of Figure 7 showed that cholesterol plays a major role in atherosclerosis 71.00 % agreed Yes and 29.00 % did not agree. Results of Figure 8 showed that work pressure leads to an increased heart rate 68.00 % said Yes and 32.00 % still did not agree with No. while Figure 9 represents diabetes can lead to atherosclerosis, 63.00 % said Yes and 37.00 % are still not aware. Figure 10 depictions that most common professionals can lead to atherosclerosis 51.00 % agreed with Engineers, 22.00 % agreed on Doctors, 23.00 % had IT, professionals, and 4.00 % agreed with Policemen. The results of Figure 11

shows that stress can lead to a risk factor for cardiac disorders 90.00 % said Yes and 10.00 % said No. Figure 12 shows that high-density protein (HDL) is good or bad 56.00 % said Yes and 44.00 % said No. Figure 13 illustrates congestive heart failure (CHF) is characterized by 44.00 % said FALSE, 39.00 % said TRUE, and 17.00 % said I don't know. Results of Figure 14 explain that stroke is caused by to lack of blood supply 44.00 % said heart, 50.00 % said brain (blue), and 6.00 % said I don't know. Results of Figure 15 depict that necrosis of the heart muscle leads to myocardial infarction 33.00 % had agreed to ischemia, 66.00 % agreed on hypoxia, and 1.00 % said I don't know. Results of Figure 16-19 show heart attack is due to 94 .00 % said atherosclerosis, 5.00 % said stroke and 1.00 % said I don't know.

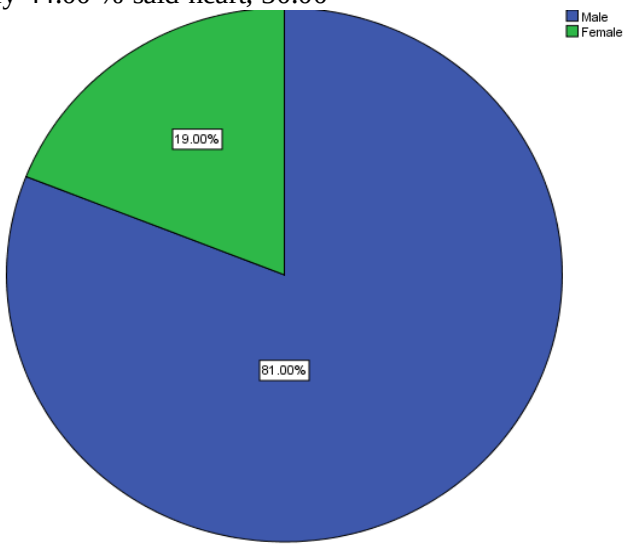

Figure 1. Pie Chart Representing Percentage Distribution of Gender of the Participants . 81.00 % - male (blue), 19.00 % - female (green)

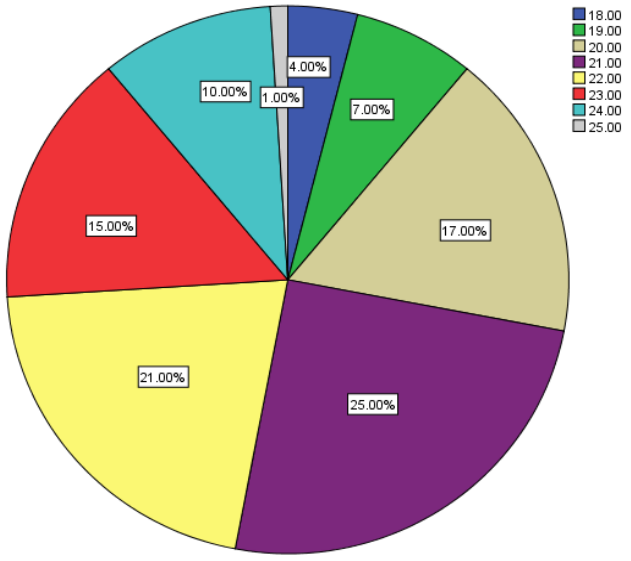

Figure 2. Pie Chart Representing Percentage Distribution of Age Group of Participants. 25 % Belong to Age Group 21 (Violet), 21 % Belong to Age Group 22 (yellow), 17 % Belong to Age Group 20 (Brown), 15 % Belong to Age Group 23 (Red), 10 % Belong to Age Group 24 (Light Blue), 7 % Belong to Age Group 19 (Green), 4 % Belong to Age Group 18 (Blue), 1 % Belong to Age Group 25 (Grey)

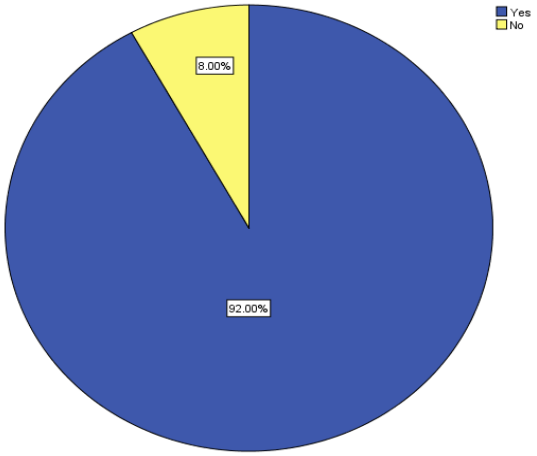

Figure 3. Pie Chart Representing Percentage Distribution of Responses About Knowledge Atherosclerosis. 92.00 % - Yes (Blue), 8.00 % - No (Yellow)

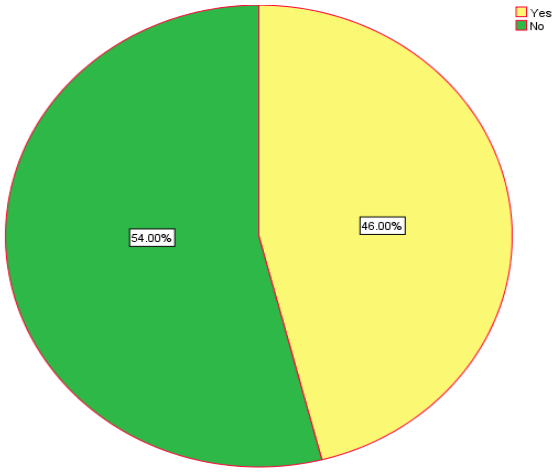

Figure 4. Pie Chart Representing the Distribution of Responses About Knowledge of Cardiovascular. 54.00 % - No (Green), 46.00 % - Yes (Yellow)

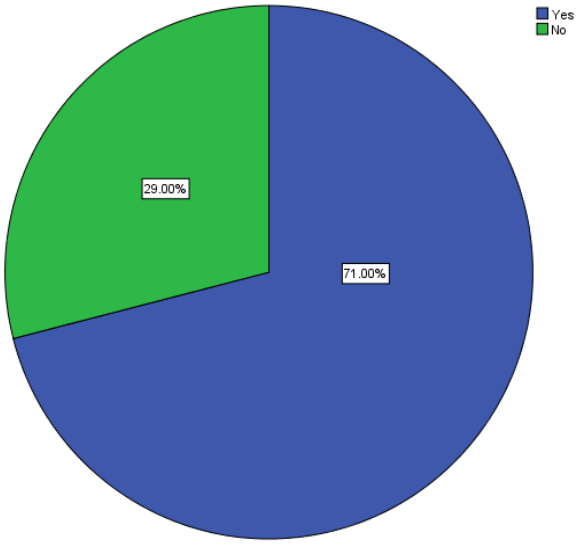

Figure 5. Pie Chart Representing The Percentage of Responses About Awareness of Different Types of Atherosclerosis, 71.00 % - Yes (Blue), 29.00 % - No (Green)

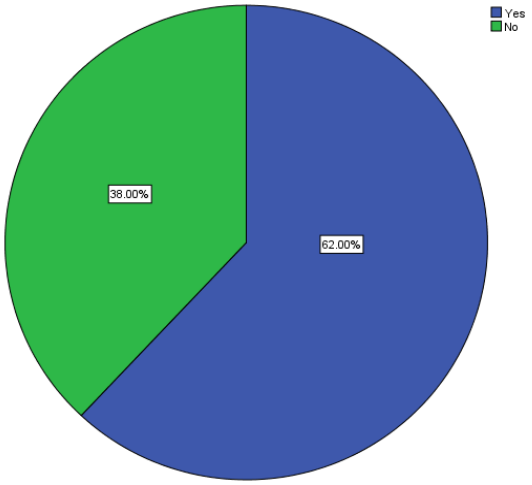

Figure 6. Pie Chart Representing The Percentage of Responses About Coronary Artery Diseases, 62.00 % - Yes (Blue), 38.00 % - No (Green)

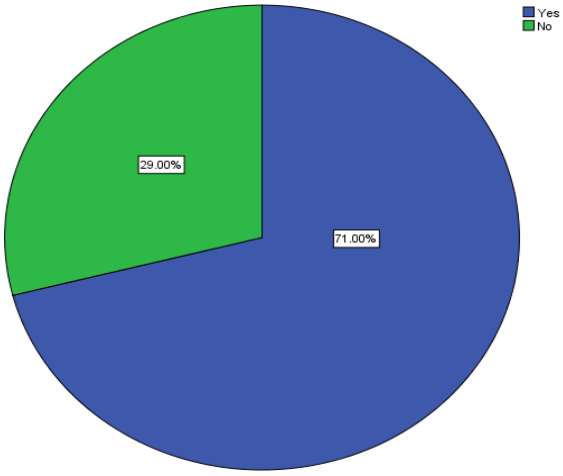

Figure 7. Pie Chart Representing The Percentage of Responses About Cholesterol Plays A Major Role in Atherosclerosis, 71.00 % - Yes (Blue), 29.00 % - No (Green)

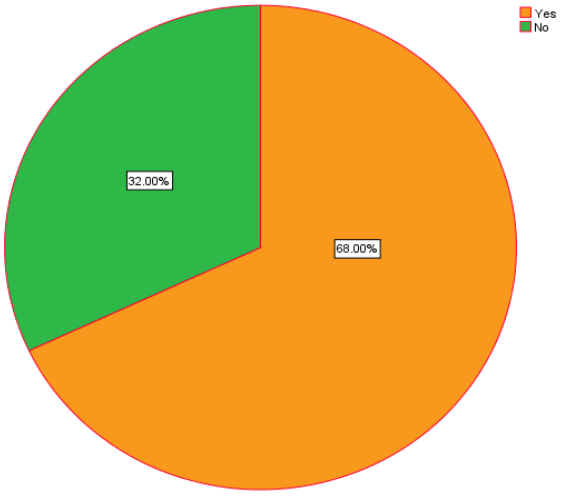

Figure 8. Pie Chart Representing A Percentage of Responses About Work Pressure Leads to Increased Heart Rate. 68.00 % - Yes (Orange) , 32.00 % - No (Green)

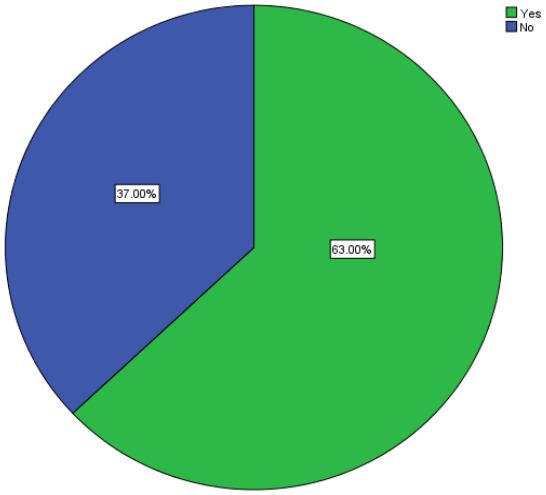

Figure 9. Pie Chart Representing The Percentage of Responses About Diabetes Can Lead to Atherosclerosis, 63.00 % - Yes (Green), 37.00 % - No (Blue)

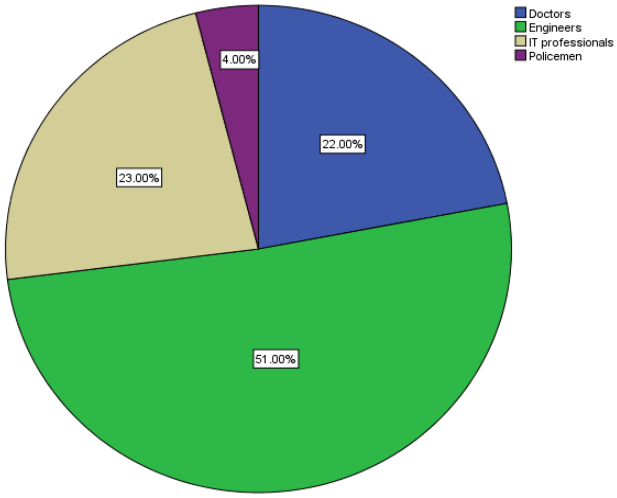

Figure 10. Pie Chart Representing Percentage of Responses About Most Common Professionals Can Lead to Atherosclerosis, 51.00 % - Engineers (Green), 22.00 % - Doctors (Blue), 23.00 % - It Professionals (Brown), 4.00 % - Policemen (Violet)

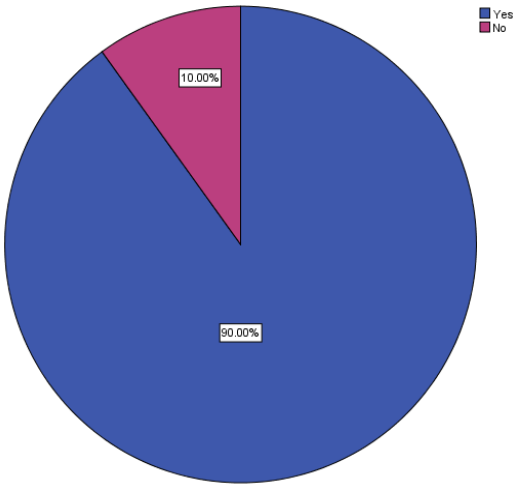

Figure 11. Pie Chart Representing the Percentage of Responses About Stress Can Lead to Risk Factor For Cardiac Disorders, 90.00 % - Yes (Blue), 10.00 % - No (Pink)

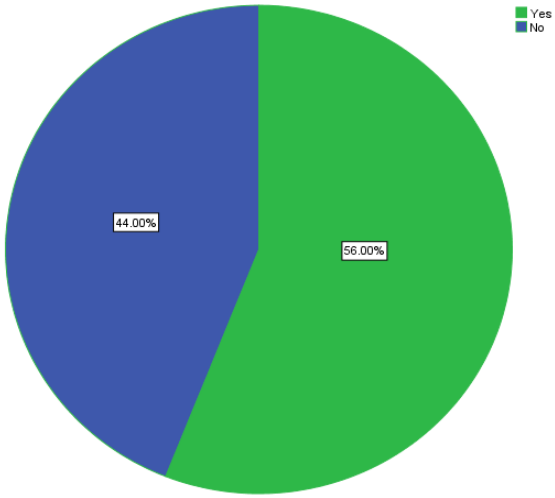

Figure 12. Pie Chart Representing The Percentage of Responses About High-Density Protein (Hdl) is Good or Not, 56.00 % - Yes (Green), 44.00 % - No (Blue)

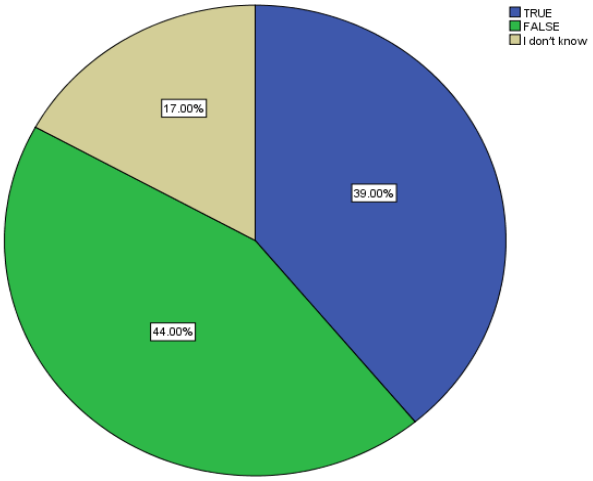

Figure 13. The Pie Chart Representing the Percentage of Responses About Congestive Heart Failure (Chf) is Characterised, 44.00 % - False (Green), 39.00 % - True (Blue), 17.00 % - I Don't Know (Brown)

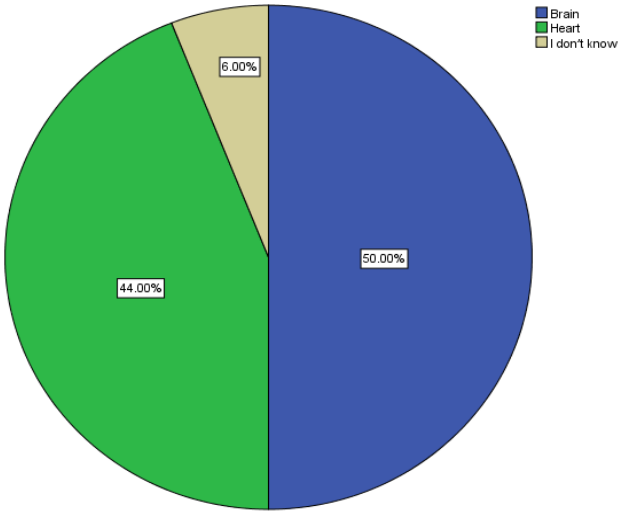

Figure 14. Pie Chart Representing The Percentage of Responses About Stroke Caused Due To Lack of Blood Supply to, 44.00 % - Heart (Green), 50.00 % - Brain (Blue), 6.00 % - I Don't Know (Brown)

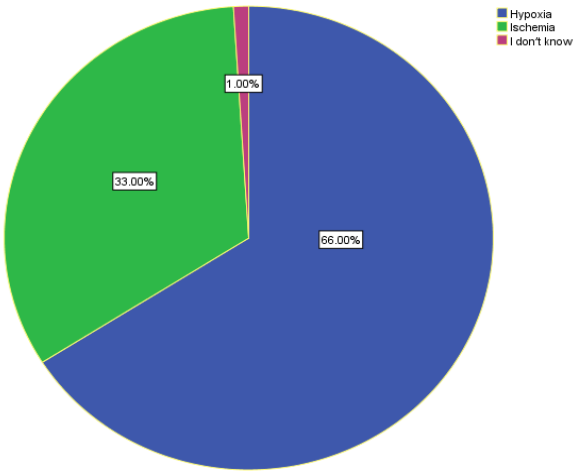

Figure 15. Pie Chart Representing The Percentage of Responses About Necrosis of The Heart Muscle Leads To Myocardial Infarction, 33.00 % - Ischemia (Green), 66.00 % - Hypoxia (Blue), 1.00 % - I Don't Know (Brown)

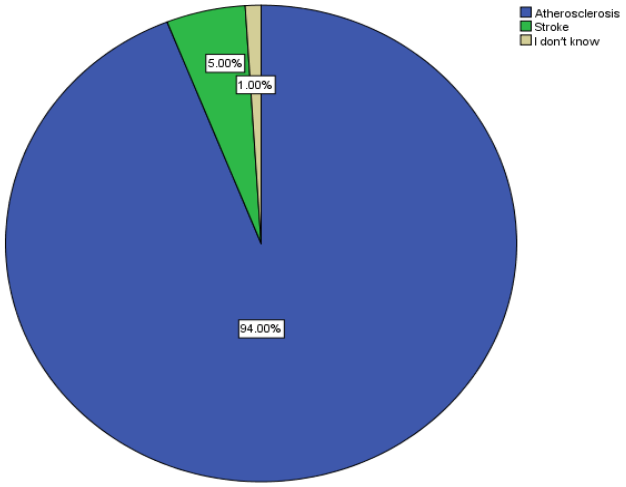

Figure 16. Pie Chart Representing Percentage of Responses About Heart Attack is Due to Atherosclerosis , 94 .00 % - Atherosclerosis (Blue) , 5.00 % - Stroke (Green) , 1.00 % - I Don't Know (Brown)

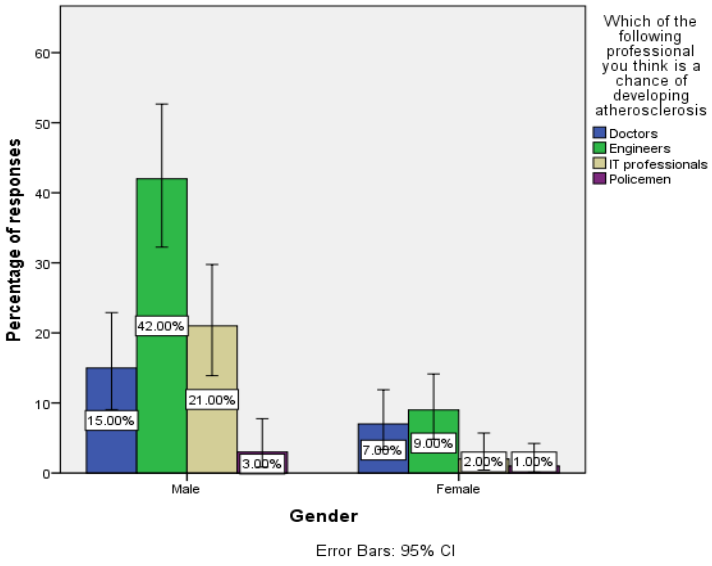

Figure 17. Bar Graph Showing the Association Between the Gender (X-Axis) and Professional May Lead to Atherosclerosis (Y-Axis)

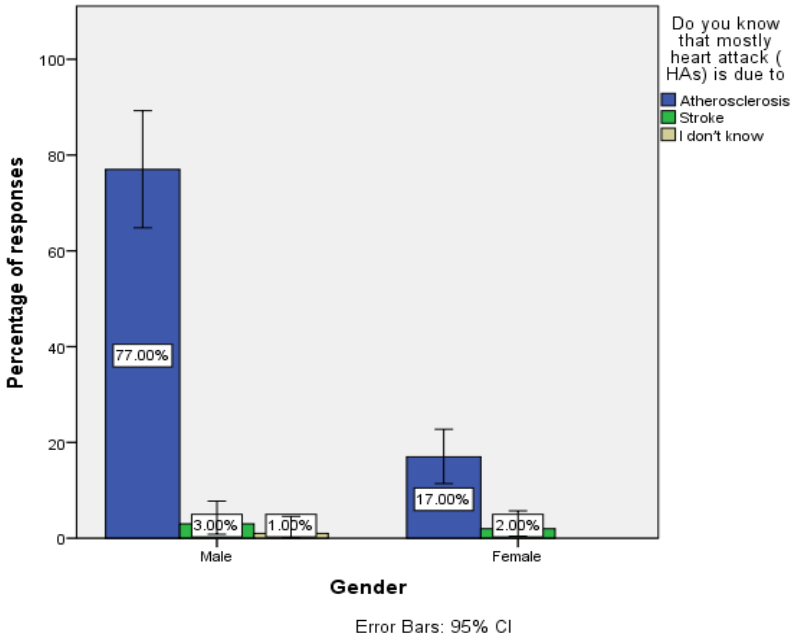

Figure 18. Bar Graph Showing an Association Between the Gender (X-Axis) and Responses Mostly Heart Attack Due to (Y-Axis)

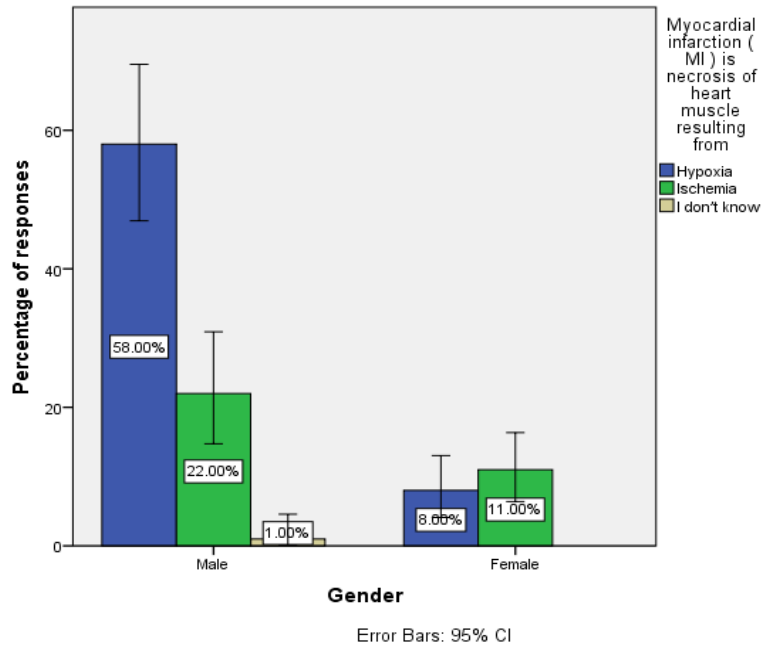

Figure 19. Bar Graph Showing An Association Between the Gender (X-Axis) and Responses to Myocardial Infarction (Mi) is Necrosis of Heart Muscle Resulting From (Y-Axis)

Discussion

Awareness of atherosclerosis and cardiovascular events among undergraduate healthcare professionals is crucial for effective patient care and prevention strategies. Studies have shown that atherosclerosis is a leading cause of cardiovascular disease worldwide, contributing significantly to morbidity and mortality rates (Libby, 2021) [15]. Understanding the pathophysiology of atherosclerosis, which involves the accumulation of plaque in arterial walls, is fundamental for healthcare professionals to recognize its implications accurately (Libby, 2021). Moreover, recognizing the modifiable

risk factors associated with atherosclerosis, such as hypertension, dyslipidemia, smoking, and diabetes, is essential for early intervention and preventive measures (Kotseva et al., 2019) [16]. Healthcare professionals need to be adept at identifying signs and symptoms of cardiovascular events related to atherosclerosis, including chest pain, shortness of breath, and neurological deficits, to ensure timely diagnosis and management.

Furthermore, education on lifestyle modifications plays a crucial role in preventing atherosclerosis and subsequent cardiovascular events. Healthcare professionals should be equipped with knowledge about promoting healthy behaviours such as regular exercise, a balanced diet, and smoking cessation to reduce the risk of atherosclerosis progression. Additionally, understanding the role of pharmacotherapy in managing atherosclerosis risk factors, such as statins for cholesterol management and antihypertensive medications, is essential for undergraduate healthcare professionals [15]. By enhancing awareness and knowledge about atherosclerosis and cardiovascular events, undergraduate healthcare professionals can effectively contribute to reducing the burden of cardiovascular disease and improving patient outcomes.

Cholesterol plays a pivotal role in the development and progression of atherosclerosis, a leading cause of cardiovascular diseases (CVDs). High levels of low-density lipoprotein cholesterol (LDL-C) are strongly associated with the formation of atherosclerotic plaques in arterial walls, initiating a cascade of inflammatory responses and endothelial dysfunction. As these plaques accumulate, they narrow and stiffen the arteries, impairing blood flow and increasing the risk of cardiovascular events such as heart attacks and strokes. Moreover, oxidized LDL particles within these plaques further exacerbate inflammation and contribute to plaque rupture, leading to acute cardiovascular events [15]. Conversely, high-density lipoprotein cholesterol (HDL-C) has a protective effect against atherosclerosis by facilitating the reverse cholesterol transport pathway, removing excess cholesterol from arterial walls and transporting it back to the liver for excretion (Rohatgi et al., 2014) [17]. Therefore, managing cholesterol levels, particularly LDL-C, through lifestyle modifications and pharmacotherapy is essential for preventing and managing atherosclerosis and reducing the risk of cardiovascular diseases.

Kamalli et al. in the year (2020), state that 43 % of the participants said cholesterol plays are major role in atherosclerosis when we compare to the study we found that 71 % agreed that cholesterol leads to atherosclerosis [12]. Huang et al. in the year (2007) [18], states that 24 % had low HDL levels when we compare with our study 56 % said that HDL is a good cholesterol. Burke et al in the year (2009) [19] stated that 33 % of obese persons led atherosclerosis when we compare this to ur study we found that due to a lack of blood supply to the brain [20-22].

A study was done by Bhalge et al. in the year 2018, he stated that 99 (72.80%) students responded that air pollution is the main cause of cardiovascular when we come to our study we found that due to lack of blood supply leads to cardiovascular because lack of oxygen in our body which may lead to lack of blood flow in our body [23-26]. The limitations of our study are the sample size, multiple questionnaire settings, responses bias, and survey fatigue. [27-30]. Future studies should aim to create awareness camps, social media, and workshops.

Conclusion

Within the limitations of the study, we may conclude that students have good knowledge and awareness of atherosclerosis and cardiovascular events. Thus, from this study,

we find that the majority of the population is unaware of the risk factors such as obesity, LDL, and family history, which leads to atherosclerosis, but only a few populations are aware of stress, smoking, coronary heart attack, cholesterol, sleep apnea, HDL, work pressure, physical activity, heart disease, and coronary disease that leads to atherosclerosis.

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Conflict of Interest

Nil.

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References

[1]Rafieian-Kopaei, M., Setorki, M., Doudi, M., Baradaran, A., Nasri, H., 2014, Atherosclerosis: Process, Indicators, Risk Factors and New Hopes. *Int J Prev Med*. 5(8), 927.

[2]Wilson, W. H., Tang, S .L. H., 2017, Advances In New Therapeutic Targets For Atherosclerosis. *Nat Rev Cardiol*. 14(2), 71.

[3]Babu, S., Jayaraman, S., 2020, An Update on β-sitosterol: A Potential Herbal Nutraceutical For Diabetic Management, *Biomed Pharmacother*, 131, 110702.

[4]Yasothkumar, D., Jayaraman, S., Ramalingam, K., Ramani, P., 2023. *In vitro* Anti-Inflammatory and Antioxidant Activity of Seed Ethanolic Extract of Pongamia pinnata. *Biomedical and Pharmacology Journal*, 16(4).

[5]Gianturco, L., 2018, Atherosclerosis: Yesterday, Today and Tomorrow. BoD – Books on Demand, 128 p.

[6]Luepker, R. V., Evans, A., McKeigue, P., Srinath, Reddy, K., 2004, Cardiovascular Survey Methods. *World Health Organization*, 185 p.

[7]Insull, W, Jr., 2009, The Pathology of Atherosclerosis: Plaque Development and Plaque Responses To Medical Treatment. *Am J Med*. 122(1), S3–14.

[8]Dutta, P., Courties, G., Wei, Y., Leuschner, F., Gorbatov, R., Robbins C, et al. 2012, Myocardial Infarction Accelerates Atherosclerosis. *Nature*. 487(7407), 325.

[9]Singh, P., Goncalves, I., Tengryd, C., Nitulescu, M., Persson, A.F., To, F., et al. 2021, Correction to: Reduced oxidized LDL in T2D Plaques is Associated with A Greater Statin Usage but not with Future Cardiovascular Events. *Cardiovasc Diabetol*. 20(1), 61.

[10] Pastori, D., Sciacqua, A., Marcucci, R., Del Ben, M., Baratta, F., Violi, F., et al. 2021. Non-alcoholic fatty liver disease (nafld), metabolic syndrome and cardiovascular events in atrial fibrillation. A prospective multicenter cohort study. *Intern Emerg Med*. 16(8), 2063-2068.

[11] Kamalli, M.K., Kavitha, S., Sangeetha, A., Vishnupriya, V., Gayathri, R., 2020, Awareness on Cardiovascular Risk Factors Among Working Women - A Questionnaire Survey. Vol. 11, *International Journal of Research in Pharmaceutical Sciences*. 11, 616-25.

[12] Sathya, S., Ragul, V., Veeraraghavan, V.P., Singh, L., Niyas Ahamed, M.I., 2020, An in vitro study on hexavalent chromium [Cr(VI)] remediation using iron oxide nanoparticles-based beads, *Environmental Nanotechnology, Monitoring & Management*, 2020, 14, 100333.

[13] Veeraraghavan, V. P., Hussain, S., Balakrishna, J. P., Dhawale, L., Kullappan, M., Ambrose, J. M, et al., 2021, A Comprehensive and Critical Review on Ethnopharmacological Importance of Desert Truffles: Terfezia claveryi, Terfezia boudieri, and Tirmania nivea, *Food Reviews International*, 1–20.

[14] Libby, P., 2021, Atherosclerosis: from

biology to therapeutics. *bioRxiv*. https://doi.org/10.1101/2021.05.06.443593.

[15] Kotseva, K., De Backer, G., De Bacquer, D., Rydén, L., Hoes, A., Grobbee, D., . & Wood, D. (2019). Lifestyle and impact on cardiovascular risk factor control in coronary patients across 27 countries: Results from the European Society of Cardiology ESC-EORP EUROASPIRE V registry. *European Journal of Preventive Cardiology*, 26(8), 824-835.

[16] Rohatgi, A., Khera, A., Berry, J. D., Givens, E. G., Ayers, C. R., Wedin, K. E., de Lemos, J.A., 2014, HDL Cholesterol Efflux Capacity And Incident Cardiovascular Events. New England *Journal of Medicine*, 371(25), 2383-2393.

[17] Huang, T. T-K., Huang, T. T., Shimel, A., Lee, R. E., Delancey, W., Strother, M. L., 2007, Metabolic Risks among College Students: Prevalence and Gender Differences. *Metabolic Syndrome and Related Disorders*. 5, 365–72.

[18] Burke, J.D., Reilly, R.A., Morrell, J.S., Lofgren, I.E., 2009, The University of New Hampshire's Young Adult Health Risk Screening Initiative. *Journal of the American Dietetic* Association. 109, 1751–8.

[19] Jagadheeswari, R., Vishnu Priya, V., Gayathri, R., 2020, Awareness of Vitamin-C Rich Foods Among South Indian Population: A Survey, *Journal of Research in Medical and Dental Science*, 8(7), 330-338.

[20] Ojastha, B.L., Selvaraj, J., Kavitha, S., Veeraraghavan Vishnu Priya., Gayathri R., 2023, Effect Of Argyreia Nervosa On The Expression Of Growth Factor Signaling In The Skeletal Muscle of Streptozotocin-Induced Experimental Diabetic Rats. *Journal of Namibian Studies: History Politics Culture*, 33, 5942-5950. https://doi.org/10.59670/jns.v33i.4474

[21] Vishaka, S., Sridevi, G., Selvaraj, J., 2022, An in vitro analysis on the antioxidant and anti-diabetic properties of Kaempferia galanga rhizome using different solvent systems. *Journal of Advanced Pharmaceutical Technology & Research*, 13(2), S505–9.

[22] Bhalge,U., Gaikwad, B., Kulkarni, P., Takalkar, A.A., Bhise, M.D., 2018. Assessment of awareness about cardiovascular diseases risk factors amongst first year medical students [Internet]. *International Journal Of Community Medicine And Public Health*. 6, 105.

[23] Karthik, E.V.G., Priya, V.V., Gayathri. R., 2021. Dhanraj Ganapathy. Health Benefits Of Annona Muricata-A Review. *International Journal of Oral Science*, 8(7), 2965–7.

[24] Mithil Vora, Vishnu Priya, V., Selvaraj,J., Gayathri, R., Kavitha, S., 2021, Effect of Lupeol on proinflammatory Markers in Adipose Tissue of High-Fat Diet and Sucrose Induced Type-2 Diabetic Rats. Journal of Research in Medical and Dental Science, 9(10),116-121.

[25] Sadasivam, P., Ganapathy, D.M., Sasanka, L.K.,2023, Assessment of Depressive Behaviour among the Undergraduate Dental students-A Survey. Turkish Journal of Physiotherapy and Rehabilitation, 32, 2.

[26] Ealla KKR, Veeraraghavan VP, Ravula NR, Durga CS, Ramani P, Sahu V, Poola PK, Patil S, Panta P (2022) Silk Hydrogel for Tissue Engineering: A Review. J Contemp Dent Pract 23:467–477

[27] Patil S, Sujatha G, Varadarajan S, Priya VV (2022) A bibliometric analysis of the published literature related to toothbrush as a source of DNA. World J Dent 13:S87–S95

[28] Ganesan A, Muthukrishnan A, Veeraraghavan V (2021) Effectiveness of Salivary Glucose in Diagnosing Gestational Diabetes Mellitus. Contemp Clin Dent 12:294–300

[29] Priya DV, (2020) Knowledge and awareness on HIV/AIDS among college students in A university hospital setting. Int J Dent Oral Sci 1182–1186

[30] Prakash S, Balaji JN, Veeraraghavan VP, Mohan SK (2022) Telehealth: Is It a Post-COVID Reality in Early Diagnosis of Oral Cancer? J Contemp Dent Pract 23:1181–1182