

Alcohol, Coronary Artery Disease With Myocardial Infarction, Lifestyle Medicine: A Case Study

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This 63 year old, heavy drinker, previous smoker man, was physically active, a community leader and with good sleeping habits. His diet: processed foods and drinks, meat, poultry products; minimal fruits and vegetables added about a year earlier. Two weeks prior, after drinking alcohol, he experienced progressive difficulty of breathing on physical exertion, relieved by rest. The night before the incident he had a drinking spree. Early morning, he had severe shortness of breath, difficulty of breathing and chest heaviness. He was rushed to the nearby hospital, was admitted at the ICU with the diagnosis of Ischemic Heart Disease with Myocardial Infarction, and, Type 2 Diabetes. The diagnosis was sustained and the management continued upon transfer to a better-equipped hospital. Strict nutritional prescription was introduced and early ambulation started while still in the hospital. His medications were steeply tapered off while lifestyle modification intensified. His progress was extraordinary. This case exemplified the havoc of heavy alcohol drinking, and, its uneventful cold turkey abstinence; favored early ambulation post myocardial infarction, and showed the independence of each CVD risk factor. Is intensive Lifestyle Modification safe and beneficial even in morbid situations?

Key words: Coronary artery disease, myocardial infarction, alcohol consumption, lifestyle medicine

INTRODUCTION

The case of this 63 year old man presents a new or uncommon medical practice which may even seem controversial. Initially, it appears as a garden variety, but the succeeding developments, ushered the opportunity for the exploration of novel management approaches. It also added clarity on some health havoc practices.

The Center for Disease Control and Prevention and the World Health Organization on the benefits of smoking cessation, mentioned that immediately after cessation, the risk of having heart attack is decreased to 50% compared to someone who did not quit smoking; and in a year, the risk of heart disease is decreased to half compared to a non-smoker.^{1,2} This patient who had about 40 pack years of smoking, quit for 5 years already. It may be anticipated that his risk for coronary artery disease was reduced.³ However, he continued drinking alcohol and then experienced Coronary Artery Disease with Acute Myocardial Infarction. This situation may show that smoking and alcohol consumption and suggestively, even other health habits are independent risk factors in developing CVD or CAD.^{4,5}

Furthermore, while early ambulation is not quite endorsed post MI,⁶ this patient was encouraged to do so, without untoward events.

Finally, while observing the standard medical practice on treating CAD with MI, an aggressive and intensive Lifestyle Modification was introduced. The careful yet steep tapering off of medications was uneventful. In fact a remarkable reversal both of diabetes and CAD with MI was observed. This case illustrated the unfavorable effects of irregular and heavy alcohol intake independent of other CAD with MI and T2D risk factors^{4,7} and illustrate the efficacy of Lifestyle Medicine even in life threatening medical conditions.

THE CASE

Description of the Case

B.M. a 63 year old man, physically active, a community leader, previous smoker, heavy drinker, with a family history of cardiovascular disease and hypertension, complained of intense difficulty of breathing associated with chest heaviness the morning after a drinking spree the night before. He had drinking sessions with similar but intermittent episodes of chest heaviness two weeks prior. That morning, his experience was so alarming – intense difficulty of breathing, cold and clammy sweats, so he was rushed to the nearby hospital and was

admitted in the ICU. His attending physician diagnosed him to have Ischemic Heart Disease with Acute Myocardial Infarction and Type 2 Diabetes Mellitus. The diagnosis was sustained and the management continued even when transferred to a more equipped hospital. It was reported that he had been drinking liquor irregularly and usually had drinking sprees. He was a heavy smoker but stopped smoking about five years prior, subsisted on processed foods and drinks, meat and poultry products, but had gradually incorporated fruits and vegetables in his diet in about a year already. His sleep of 7-8 hours regularly and with naps got interrupted by celebrations, holidays, wakes and emergencies. During such times, binge drinking occurred. His wife and daughter virtually consulted Aim Health Wellness Center. During the consult, he was in bed with head elevated, on oxygen inhalation with no less than 10L/min flow. He looked tired and wilted. He had intravenous inserted and had urinary catheter on. His vital signs were within normal limits with medications. The patient consented on having the virtual consults and was willing to follow lifestyle changes. Arrangements were made with the in house physician. The food recommendations were immediately heeded. After two days in the ICU, he stayed four days in the private room, eating only the foods prepared by the family. He had early ambulation (EM) daily. His hospital stay was uneventful and was discharged with several medications including insulin injections.

Treatment

At the hospital, standard patient care for Coronary Artery Disease with Myocardial Infarction and Type 2 Diabetes Mellitus was done. During the virtual consult and the succeeding conversations, the patient was made to understand the pathogenesis of his condition. He was told of the different risk factors of coronary artery disease with myocardial infarction, especially the modifiable ones: food and drinks, physical activity and sleep, stress management, healthy relationships, and avoidance of harmful substances especially alcohol. He also was made to understand the treatment he was subjected to and the recommended plan of management using Lifestyle intervention.

Diet

- Avoid fatty oily, processed and predominantly meat and poultry sources
- More of whole food plant based, observing the rainbow color: 5-7 kinds of fresh fruits in the morning. Fresh, home-made sprouts, grains, nuts, beans, vegetables of different colors, 1 cup of red/black rice or, boiled green bananas, rootcrops at noon; leafy vegetable soup at night
- Occasional non-oil cooked fish; 1 boiled native chicken egg per month
- Avoid snacks. Only sips of warm water or tea made of leaves/flowers

Physical Activity

- Regular brisk walking 30-60 minutes 5x weekly.
- Avoid watching the television and/or sitting down beyond one hour

- Avoid heavy lifts

Sleep and Rest

- 7- 8 hours of sleep at night. No more than 20 minutes of nap at noon

Stress Management using deep breathing and prioritizing issues to tackle only what is needed and controllable. Prayer and meditation were reinforced since those are of value to him. Positive social relationships with the family and community and positive emotions were encouraged.

Avoidance of risky substances was outlined. He was made to remember his near death experience and how valuable he is to the family and community. He realized how his previous indulgence led to his condition. So, understanding risk factors and the value of a determined decision, he acted on his decision never to drink alcoholic drinks again and to adhere to the prescribed diet and lifestyle recommendations.

He took only the medications at the dose the Wellness Center recommended. Some of the medications prescribed were immediately stopped - the laxatives because frequent bowel movements ensued; his blood pressure control medications- since he was already normotensive, and the food served was already of low sodium, inspired by the DASH Diet.⁸ Some were tapered off - his insulin and oral hypoglycemic: based on the blood sugar monitoring; his diuretics and anti-platelet aggregation and other cardiac medications, based on physical and clinical conditions.⁹ His cholesterol lowering medications were never administered after his ICU stay since statins only regulate the body's cholesterol synthesis and not the dietary cholesterol intake.¹⁰ Also, the patient had some liver enzymes elevations, so, statins were not administered due to some potential toxicity on the liver¹¹ and endothelial lining derangements associated with CoQ10 depletion.¹² Interestingly, his cholesterol profile improved with Lifestyle modification.

After three weeks, the patient was brought to AIM Health Wellness premises. Discussions and videos regarding lifestyle management were presented to him. He was told of the Ornish 5-year study on the reversal of Coronary Heart Disease using intensive lifestyle changes.⁹ So, Intensive Lifestyle Change was prescribed and applied. He was put on predominantly WFPB diet with breakfast of seven or more fresh fruits; lunch of vegetables, nuts and grains⁹ with occasional, no-oil-cooked fish and once a month boiled native chicken egg. He had dinner of vegetable soup.⁹ Between meals, only sips of water and hot tea of some leaves and flowers were taken. This was an improvement to his past meals of high fat and processed food three times daily and two to three snacks, although gradual incorporation of fruits and vegetables were already done. A progressive physical activity,⁵ sunbathing for 10 minutes at noon¹³, 7-8 hours sleep and nap¹⁴ with lifestyle enhancing program^{15,9} was implemented. The patient soon walked about 5-7 kilometers⁵ daily. He also was coached to identify possible stressors in his life and stress management techniques¹⁶ were shared like deep breathing, mindfulness and meditation.¹⁷ An open communication was established between physician and wellness staff and the patient as well as the family and friends with the patient and the wellness personnel.¹⁸ Positive outlook,¹⁹ prayer and forgiveness²⁰ were encouraged. More

importantly, as strictly as he avoided cigarettes, so he did completely abstain from any alcoholic drinks.⁴ His family and friends showed strong support on the recommended management. Encouragement was offered to him generously.²¹

Table 1. Dietary intervention

| Category | # of Serving | Examples |
|---------------|--|---|
| Grain & nuts | 3-4 servings 1 serving nuts | Organic corn grits, chia seeds Walnuts, almond, hazel, pecans |
| Protein | 2-3 servings 1-2 servings 1-2 servings | Different beans, garbanzo Monggo, string beans Boiled/steamed fish |
| Greens | 2-3 servings | Alugbati, ampalaya, malunggay, tops, pechay |
| Other veggies | 2-3 servings | Squash, eggplant, okra, upo, sayote, patola |
| Fruits | 4-6 servings | Pomelo, mandarin and other citruses, guyabano, papaya, avocado, buko, rambutan, fruits in season |
| Drinks | 8-10 glasses | Water, green tea, buko |

Results and Follow up

After two weeks, during his attending physician's follow up visit, he was able to climb up a 20 step stairs with almost no discomfort. His

insulin was inadvertently left at home, so he received none for more than a couple of days. His FBS reading was not elevated despite. So, tapering insulin off was easy. Shortly, it was discontinued.

For barely 6 weeks, he walked for more than four kilometers roundtrip in the morning and 2-3 shorter round trips in the afternoon and early evening as the weather permitted. He had a morning walk, up a slightly elevated area, and, he was able to climb up the second floor of the house of at least 16 steps with ease. His FBS: 90 -106. Repeat HbA1c = 8.83% (from 11.78%), his uric acid, SGPT and SGOT were within normal range when they all were above normal limits initially. His insulin which was quickly tapered off and his oral hypoglycemic were no longer administered. All his maintenance medications was less than half the dose from the initial.

For a more complete work up, ultrasound was ordered which revealed: Atheromatous aorta; Fatty liver, moderate; Mild renal parenchymal disease, bilateral. Repeat laboratory and ultrasound results showed significant improvement.

After eight weeks, he was off all pharmacologic management. He was maintained on intensive non-pharmacologic Lifestyle Medicine practices to the present. His recovery was outstanding.

DISCUSSION

As was taught, "A heart attack (medically known as a myocardial infarction) is a deadly medical emergency where your heart muscle begins to die because it isn't getting enough blood flow... If blood flow isn't restored quickly, a heart attack can cause permanent heart damage and death."²² "Ischemic heart disease/coronary heart disease (CHD) or coronary artery disease can be caused by a blood clot or by constriction of the blood vessel... When the blood flow to the heart muscle is completely blocked, the heart muscle cells die, which is termed a heart attack or myocardial infarction (MI)".²² This patient may have partial occlusion to the heart muscle since there was a period of time that symptoms had been experienced upon strenuous activity and yet was relieved by rest. Otherwise, the relief should have not been

Table 2. Monitoring of health status in the hospital and in the health wellness.

| | Hospital 7/29/22 | Wellness 9/6/22 | Wellness 10/4/22 | House 1/10/2023 |
|-------------------|---------------------|--------------------|---------------------|--------------------|
| Weight | 68kg | 67kg | 65kg | 66kg |
| BP | 120/70 | 93/70 | 93/78 | 105/70 |
| BMI | 24.21 | 23.89 | 23.08 | 23.40 |
| FBS | 163 | 105 | 101 | 110 |
| Total Cholesterol | 124.51 | 232.28 | 244.36 | 206.59 |
| HDL | 24.36 | 36.92 | 40.12 | 39.62 |
| LDL | 67.67 | 166.64 | 170.90 | 127.14 |
| Triglycerides | 165.6 | 143.58 | 166.72 | 199.14 |
| Blood Uric Acid | 9.37 | 6.9 | - | 8 |
| HbA1C | 11.78% | 8.83% | 7.32% | 6.81 |
| SGOT | 219.6 | 21.3 | - | 29 |
| SGPT | 137.9 | 12.4 | - | 10.2 |

noted. But that moment, the blockage may have worsened that rest did not anymore offer relief.

What could have caused the occlusion? "Coronary artery disease starts when fats, cholesterol and other substances collect on the inner walls of the heart arteries called atherosclerosis. The buildup is called plaque, causing the arteries to narrow, blocking blood flow... or, burst, leading to a blood clot. Besides high cholesterol, damage to the coronary arteries may be caused by: diabetes or insulin resistance, high blood pressure, not getting enough exercise (sedentary lifestyle), smoking or tobacco use."^{3,5,12} Among the causes enumerated, diabetes is the only culprit, since the patient did not have history of hypertension, had been physically active and ceased from smoking for about 5 years already. Yet, it may be safe to surmise that something other than the diabetes may have precipitated the heart attack. The risk factors: Older age, male sex, women after menopause, family history-highest if father/brother had heart disease before age 55 or mother/sister before age 65, smoking, secondhand smoke, uncontrolled high blood pressure, high cholesterol- increased (LDL) and low good cholesterol (HDL), diabetes, overweight or obesity, chronic kidney disease, not getting enough exercise, a lot of stress, unhealthy diet with saturated fat, trans fat, salt and sugar, alcohol use, amount of sleep"^{23,5,3} are to be scrutinized. Among the risk factors, the following were noted to be present in the patient: age, male sex, family history, dyslipidemia, diabetes, diet and alcohol use. Of the latter list, alcohol use appeared to be the most acute.

The literatures state that "comprehensive management of angina and stable CHD includes: identification and treatment of associated diseases that can precipitate or worsen angina and ischemia; cardiac risk factor identification and intervention; application of pharmacological and non-pharmacological interventions for secondary prevention; pharmacological and symptomatic management of angina and ischemia; and myocardial revascularization with PCI or CABG surgery, when indicated. Three drug classes have been demonstrated to reduce mortality and morbidity in patients with stable CHD and preserved left ventricular (LV) function: aspirin, angiotensin-converting enzyme (ACE) inhibition, and effective lipid lowering. Beta-blockers have been shown to reduce mortality in patients with prior MI (CAPRICORN Investigators, 2001). Other therapies such as nitrates, beta-blockers, calcium channel blockers, and ranolazine have been shown to improve angina and exercise performance and to reduce ischemia, but have not been proven to reduce mortality in patients with stable CHD."^{24,25} The patient was started on the standard care of management at the ICU. Upon transfer to the private room, Lifestyle Medicine interventions were started. Immediately, the food was addressed, offering only whole food plant-based diet (WFPB) meals.²⁶ Then early ambulation was introduced despite the sparsity of medical adherents.⁶ Upon discussion with the patient and the relatives present, the patient decided and the family members supported the decision to completely eliminate alcohol use. This is not the popular practice nor recommendation. Regular, moderate use may be more beneficial than complete cessation.^{27,28} The cholesterol lowering medications were not continued when the patient was transferred out from ICU due to the potential liver toxicity and endothelial damage associated with CoQ10 depletion.^{11,12} All other medications were carefully but steeply tapered off. No untoward incidents were noted.

Despite the deadly coronavirus disease 2019 (Covid-19) battering the country, coronary heart disease remains the top cause of death in the Philippines from January to November last year (2021), according to the Philippine Statistics Authority (PSA).²⁹ The patient could have been part of this statistics. But favorable experiences ensued.

Bedrest and immobilization following a myocardial infarction (MI) can lead to functional impairment that can persist following hospitalization. Early mobilization (EM) is associated with good functional and clinical outcomes in critical care, medical and surgical settings. However, the impact and current role of EM in post-MI care has not been well-defined... Most have their initial hospitalization period lying in bed. Only 1 of 7 current major cardiovascular professional societies guidelines recommend EM post-MI. There are no studies exploring the perspectives of cardiovascular professionals toward mobilization. There is an evidence gap for the impact of EM post-MI in the available literature. More robust evidence from randomized clinical trials are required to inform clinicians and influence practice."⁶ Despite the unpopularity of early ambulation, the patient was encouraged to practice it. He exemplified the benefits of early post MI ambulation.

Epidemiological studies have demonstrated an inverse correlation between moderate wine and alcohol consumption and morbidity and mortality from coronary heart disease (CHD). This protective effect has been associated with an increase in the plasma level of high density lipoprotein (HDL)-cholesterol, as it is well known that plasma HDL is inversely correlated with CHD. In addition, it has become evident that blood platelets contribute to the rate of development of atherosclerosis and CHD through several mechanisms. Recent studies have shown HDL-cholesterol levels can explain only 50% of the protective effect of alcoholic beverages. The other 50% may be partly related to decreased platelet activity. The antiplatelet activity of wine is explained not only by ethanol but also by the polyphenolic components with which red wines are richly endowed. Several studies carried out in humans and animals have shown that wine phenolics could exert their effects by reducing prostanoid synthesis from arachidonate. In addition, it has been suggested that wine phenolics could reduce platelet activity mediated by nitric oxide. Moreover, wine phenolics increase vitamin E levels while decreasing the oxidation of platelets submitted to oxidative stress. However, a rebound phenomenon of hyperaggregability is observed after acute alcohol consumption but not after wine consumption."^{26,27} "This protection afforded by wine has been duplicated in animals with grape phenolics added to alcohol. This rebound phenomenon could explain ischemic strokes or sudden deaths known to occur after episodes of drunkenness. It appears that wine and wine phenolics in particular could significantly inhibit platelet aggregation and that this could explain, at least in part, the protective effect of red wine against atherosclerosis and coronary heart disease."^{4,7} The patient took different kinds of wine and alcoholic drinks. Moderation was not observed in majority of his drinking sessions. In his decision to totally abstain from alcoholic drinks, the benefits from the said drinks were noted and explained. He still opted to abstain.

Several epidemiological data both on apparently healthy people and on patients with a history of cardiovascular events, indicate a consistent risk reduction in cardiovascular events or all-cause mortality

among moderate alcohol drinkers, but, on the other hand, the harm of excess and irregular drinking. If cardiovascular patients are heavy alcohol drinkers, they must be strongly advised to abstain or at least substantially reduce alcohol drinking in the range of the “protective windows” showed in recent meta-analyses; if not contraindicated, regular alcohol consumers should not exceed one drink/day for women or up to two drinks/day for men as a component of a balanced cardio-protective dietary pattern with appropriate energy intake levels. At present, the authors believe that a cardiovascular patient who is teetotaler should neither be recommended, nor “prescribed” to start drinking for health gain.⁴ This patient, however, was properly informed of the potential health benefits of a regular habit of drinking alcohol in moderation. The ability to attain the needed benefits can be provided for, by intake of fresh fruits and vegetables, so there was no hesitancy in his part to stop cold turkey.

The patient reported of regular physical activity. This was encouraged despite the study that showed, “Physical activity interventions were more effective than drug treatment among patients with stroke (odds ratios, exercise v anticoagulants 0.09, 95% credible intervals 0.01 to 0.70 and exercise v antiplatelets 0.10, 0.01 to 0.62). Diuretics were more effective than exercise in heart failure (exercise v diuretics 4.11, 1.17 to 24.76). Inconsistency between direct and indirect comparisons was not significant.”²⁴

He had good sleeping habits of 7-9 hours of sleep with naps and incorporation of fruits and vegetables in his diet for about a year already. He ceased from smoking about 5 years past. His social relations were strong. Only his wine and alcohol drinks remained a challenge. This elucidates the independent risk factor that alcohol use poses on the development of Coronary Artery Disease with Myocardial Infarction.⁵ The type 2 diabetes may be an additional risk factor in this case. Whether wine and alcohol intake also contributed to the development of his T2D would be a good study to pursue.

Regarding wine and alcohol use, the literature cited pointed that moderation and regularity can be beneficial.^{4,7} The patient however, claims to have occasional binge drinking on weekends, holidays, celebrations and when there was wake. So both irregularity and excessive drinking were practiced. It maybe of no surprise that the protective and or beneficial effects of alcohol use was not experienced. As to the patient’s decision of complete abstinence rather than moderation, no discomfort nor any form of difficulty was reported. To date, the patient is doing well.

Perspective on the Case

“I am very grateful of the medical management I had regarding my case. Lifestyle Medicine intervention is very helpful. I have no difficulty in following the recommendations. In the contrary, I find enjoyment in following the daily routine.

I had not experienced any setbacks. Should someone have a similar case as I have, or even a different health challenge, I will strongly recommend the Lifestyle Medicine intervention. I am very satisfied with my experience and the results.

I cannot keep thanking God and my Lifestyle Medicine physician for this new life I am experiencing.”

Learning Points/Take Home Messages

1. This is a classic case of Coronary Artery Disease with Myocardial Infarction managed with a standard of care approach, which was carefully transitioned to a purely Lifestyle Medicine management.
2. This case illustrates the harmful effects of excessive alcohol consumption and favored the understanding that alcohol consumption risk is independent to the effects of smoking and probably other lifestyle practices.
3. Immediate total abstinence from heavy alcoholic drinks did not manifest any adverse reactions in the patient. A similar positive result maybe experienced by other patients.
4. Early ambulation (EM) post MI is rarely considered in the management. However, this case showed no deterrents in applying it and may even have favored early recovery from and reversal of the disease processes.
5. Lifestyle Medicine, properly and cautiously administered will augment standard of care management and may replace the pharmacologic approach in the treatment, reversal and secondary prevention of Coronary Artery Disease with Myocardial Infarction.

REFERENCES

1. World Health Organization. Fact sheet about health benefits of smoking cessation. <https://www.who.int/news-room/questions-and-answers/item/tobacco-health-benefits-of-smoking-cessation>.
2. Center for Disease Control and Prevention. Cardiovascular Health Benefits of Quitting Smoking.2022. https://www.cdc.gov/tobacco/quit_smoking/how_to_quit/benefits/#
3. Price JF, Mowbray PI, Lee AJ, Rumley A, Lowe GDO, Fowkes FGR. Relationship between smoking and cardiovascular risk factors in the development of peripheral arterial disease and coronary artery disease; Edinburgh Artery Study: Edinburgh Artery Study. *Eur Heart J* 1999; 20(5): 344–53, <https://doi.org/10.1053/euhj.1998.1194>
4. Roerecke M, & Rehm, J. Alcohol consumption, drinking patterns, and ischemic heart disease: a narrative review of meta-analyses and a systematic review and meta-analysis of the impact of heavy drinking occasions on risk for moderate drinkers. *BMC Med* 2014 ;12: 182. <https://doi.org/10.1186/s12916-014-0182-6>
5. Godsland IF, Leyva, F, Walton C, Worthington M & Stevenson JC. Associations of smoking, alcohol and physical activity with risk factors for coronary heart disease and diabetes in the first follow-up cohort of the Heart Disease and Diabetes Risk Indicators in a Screened Cohort study (HDDRISC-1). *J int Med* 1998; 244(1): 33–41. <https://doi.org/10.1046/j.1365-2796.1998.00312.x>
6. Munir H, Fromowitz J & Goldfarb M. Early mobilization post-myocardial infarction: A scoping review. *PLoS ONE* 2020; 15(8): e0237866. <https://doi.org/10.1371/journal.pone.0237866>
7. Ruf JC. Wine and polyphenols related to platelet aggregation and atherothrombosis. *Drugs Exp Clin Res* 1999; 25(2-3): 125-31. PMID: 10370875.
8. Hodson L, Harnden KE, Roberts R, Dennis AL & Frayn KN. Does the DASH diet lower blood pressure by altering peripheral vascular function?. *Journal of human hypertension* 2010; 24(5): 312–9. <https://doi.org/10.1038/jhh.2009.65>

9. Ornish D, Scherwitz LW, Billings JH, Brown SE, Gould KL, Merritt TA, Sparler S, Armstrong WT, Ports TA, Kirkeeide RL, Hogeboom C & Brand RJ. Intensive lifestyle changes for reversal of coronary heart disease. *JAMA* 1998 ;280(23): 2001–7. <https://doi.org/10.1001/jama.280.23.2001>
10. McIver LA, Siddique MS. Atorvastatin. [Updated 2022 Sep 2]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK430779/>
11. Pek SL, Tavintharan S, Woon K, Lin L, Ong CN, Lim SC & Sum CF. MicroRNAs as biomarkers of hepatotoxicity in a randomized placebo-controlled study of simvastatin and ubiquinol supplementation. *Exp Biol Med* (Maywood, N.J.) 2016; 241(3): 317–30. <https://doi.org/10.1177/1535370215605588>
12. Hamilton SJ, Chew GT & Watts GF. Coenzyme Q10 improves endothelial dysfunction in statin-treated type 2 diabetic patients. *Diab Care* 2009; 32(5): 810–2. <https://doi.org/10.2337/dc08-1736>
13. Reichrath J & Reichrath S. Hope and challenge: the importance of ultraviolet (UV) radiation for cutaneous vitamin D synthesis and skin cancer. *Scand J Clin Labor Invest Suppl* 2012; 243: 112–9. <https://doi.org/10.3109/00365513.2012.682876>
14. Sleep Deprivation and Deficiency. National Institutes of Health. 2022. <https://www.nhlbi.nih.gov/health-topics/sleep-deprivation-and-deficiency>.
15. Yusuf S, Hawken S, Ounpuu S, Dans T, Avezum, A, Lanas F, McQueen M, Budaj A, Pais P, Varigos J, Lisheng L & Interheart Study Investigators. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. *Lancet* (London, England) 2004; 364(9438): 937–52. [https://doi.org/10.1016/S0140-6736\(04\)17018-9](https://doi.org/10.1016/S0140-6736(04)17018-9)
16. Shi Y & Lan J. Effect of stress management training in cardiac rehabilitation among coronary artery disease: a systematic review and meta-analysis. *Rev Cardiovasc Med* 2021; 22(4): 1491–501. <https://doi.org/10.31083/j.rcm2204153>
17. Tacón AM, McComb J, Caldera Y & Randolph P. Mindfulness meditation, anxiety reduction, and heart disease: a pilot study. *Fam Comm Health* 2003; 26(1): 25–33. <https://doi.org/10.1097/00003727-200301000-00004>
18. Atlas SJ, Grant RW, Ferris TG, Chang Y & Barry MJ. Patient-physician connectedness and quality of primary care. *Ann Int Med* 2009; 150(5): 325–35. <https://doi.org/10.7326/0003-4819-150-5-200903030-00008>
19. Yanek LR, Kral BG, Moy TF, Vaidya D, Lazo M, Becker LC & Becker DM. Effect of positive well-being on incidence of symptomatic coronary artery disease. *Am J Cardiol* 2013; 112(8): 1120–5. <https://doi.org/10.1016/j.amjcard.2013.05.055>
20. Waltman MA, Russell DC, Coyle CT, Enright RD, Holter AC & M Swoboda C. The effects of a forgiveness intervention on patients with coronary artery disease. *Psychol Health* 2009; 24(1): 11–27. <https://doi.org/10.1080/08870440903126371>
21. Seeman TE & Syme SL. Social networks and coronary artery disease: a comparison of the structure and function of social relations as predictors of disease. *Psychosomatic Med* 1987; 49(4): 341–54. <https://doi.org/10.1097/00006842-198707000-00003>
22. Mayo Clinic. Coronary Artery Disease. <https://www.mayoclinic.org/diseases-conditions/coronary-artery-disease/symptoms-causes/syc-20350613>
23. Cleveland Clinic. Heart Attack (Myocardial Infraction). <https://my.clevelandclinic.org/health/diseases/16818-heart-attack-myocardial-infarction>
24. Rousan TA, & Thadani U. Stable Angina Medical Therapy Management Guidelines: A Critical Review of Guidelines from the European Society of Cardiology and National Institute for Health and Care Excellence. *Eur Cardiol* 2019 ;14(1): 18–22. <https://doi.org/10.15420/ecr.2018.26>.
25. Shah A, Gandhi, D, Srivastava S, Shah KJ & Mansukhani R. Heart failure: A class review of pharmacotherapy. *P & T* 2017; 42(7): 464–72.
26. Kaiser J, van Daalen KR, Thayyil A, Cocco MTARR, Caputo D & Oliver-Williams C. A systematic review of the association between vegan diets and risk of cardiovascular disease. *J Nutr* 2021; 151(6): 1539–52. <https://doi.org/10.1093/jn/nxab037>
27. Liu YT, Lee JH, Tsai MK, et al. The effects of modest drinking on life expectancy and mortality risks: a population-based cohort study. *Sci Rep* 2022; 12: 7476. <https://doi.org/10.1038/s41598-022-11427-x>
28. Klatsky AL. Moderate drinking and reduced risk of heart disease. *Alcohol Research & Health* 1999; 23(1): 15–23.
29. The Philippine News Agency. Heart disease remains top cause of death in PH in 2021: PSA. <https://www.pna.gov.ph/articles/1168439>