

Meat Consumption Behaviors among Cardiac Patients: The Dilemma of Red Meat and White Meat

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Abstract

Background: A healthy diet composed of low-saturated fat, high-fiber, high plant food has been shown to reduce the potential of adverse outcomes. On the other hand, red meat is tied to elevated risks of diabetes and cardiovascular disease. With this study, we aim to find out the meat consumption behaviors among the cardiac patients as well as to discover their perception about red meat and white meat.

Methods: A total of 300 patients were surveyed at the Cardiac Center of Texas followed by a comprehensive literature search in the available databases (PubMed, Google Scholar) to identify studies that assessed mean consumption trends among patients with cardiovascular disease.

Results: The survey showed that the average meat consumption is relatively higher among men than women. They also have a higher red meat consumption per week. People in general eat more white meat compared to red meat. This is also largely due to the false perception of pork considered white meat (70.3% of the total subjects thought it is white meat).

Conclusion: A huge part of population uses meat particularly red and processed meat as a major component of their diets. There is a need to increase public's awareness about the unhealthy impact of eating red meat. Mass awareness should be created about pork being red meat and not the other white meat. Findings of this study can inform public health policy priorities for improving diet and reducing chronic disease burden in United States.

Keywords: Red Meat; White Meat; Cardiovascular Disease; Diet

Introduction

The consumption of meat is prevalent in most of the population in the world. In recent years, many people have opted out of consuming meat and are getting their source of protein and vitamins from plant-based sources [1]. Still, a considerable portion of the population, especially in US, consumes larger proportion of meat that is processed, meaning that it has gone under the addition of preservatives or sodium in order to extend shelf life or enhance taste [2]. It has been believed that most of the issues and risks that come with red meat intake comes from its cholesterol content and amount of saturated fats. However, it would be interesting to highlight that recent studies [21] have brought up the association between Trimethylamine-N-oxide (TMAO) and increased risk of cardiovascular disease. Dietary L-carnitine, a trimethylamine abundant in red meat, is metabolized by intestinal microbiota. This produces TMAO and potentiates atherosclerosis. High L-carnitine levels along with raised TMAO levels in subjects undergoing cardiac evaluation predict increased risks for both cardiovascular disease (CVD) and major adverse cardiac events (MI, stroke or death). This shows how consumption of red meat, especially processed, is associated with an increased risk of several major chronic diseases such as diabetes, coronary heart disease, heart failure,

cancer at several sites, and eventually mortality [3,7,11]. It has been observed that the adoption of Mediterranean or DASH-type dietary patterns may contribute to the prevention of HF [2-4]. According to [1] a vegan diet resulted in a significant 32% lower high-sensitivity C-reactive protein (β , 0.68, 95% confidence interval [0.49 - 0.94]; $P = 0.02$) when compared with the American Heart Association diet. A vegan diet may be considered to lower high-sensitivity C-reactive protein as a risk marker of adverse outcomes. Similarly, Low-carbohydrate diet may improve the oxygen saturation in patients with chronic stable heart failure [5] whereas $\omega 3$ fatty acids supplements (e.g. fish) are recommended in individuals with elevated blood triglyceride levels and patients with coronary heart disease. Health authorities recommend the general population should consume at least two oily fish meals per week [6] whereas higher intake of processed meat or unprocessed red meat, but not poultry or fish, was significantly associated with a small increased risk of all-cause mortality [15].

According to the American Heart Association (AHA), cardiovascular disease is the leading cause of morbidity and mortality in the United States. In order to avoid any heart complications, the recommendations given by the AHA are there to improve dietary and lifestyle habits. Meat consumers should balance their caloric intake and regular physical activity to remain healthy. It is also recommended to consume fish at least twice a week and limit cholesterol intake by also consuming lean meats and plant-based alternatives [4]. A substantial problem in limiting red meat intake the socioeconomic status of the country you reside in. This is because of the evidence shown to support that over 80% of CVD deaths occur in low- and middle-income countries [5]. Socioeconomic status plays a huge role in determining the overall health of the population of meat consumers. Studies have shown that the price of red meat is much lower than the price of white meat. This shows a direct correlation in CVD deaths among the lower- and middle-income population because they are more likely to buy the cheaper, processed meats rather than the slightly pricier, healthier option of white meats if they are being financially careful. This makes it nearly impossible for the lower- and middle-income populace to afford healthier options for meat consumption. Not only does this invisible barrier harm their health in the long run, but evidence strongly suggest the risks and death rate associated with CVD risk and high levels of red meat consumption whereas plant-based sources, poultry, and fish have shown nominal risks when compared.

Methods

We examined trends in meat consumption among patients at the Cardiac Center of Texas. After an informed consent, patients were provided with a short questionnaire to fill. The survey was administered to 300 patients from May 2020 - July 2020 to assess meat consumption behaviors, attitudes towards meat, what respondents thought of red meat vs white meat and socioracial characteristics. The surveys were distributed randomly among the patients. The collected data was stratified according to age, gender and race. The following questions were asked in the questionnaire: 1) Do you eat meat? 2) Do you eat red meat or white meat > 4 times a week? 3) What do you think of pork, chicken and lamb as red meat or white meat?

Following the survey collection, we searched various databases (PubMed, Research Gate, MedLine, Google Scholar) for any cohort study, case-control study, randomized trial or meta-analysis that assessed meat consumption behaviors, its detrimental effects on health and peoples' preferences on choosing different types of meat. The following survey was used during the study.

Results

We classified the data into three different categories: age, gender and race.

Medical Student Research Survey on Dietary Habit of Cardiac Patients

1. Do you eat meat?
 - a. Yes
 - b. No
2. Do you eat red meat > 4 times a week?
 - a. Yes
 - b. No
3. Do you eat white meat > 4 times a week?
 - a. Yes
 - b. No
4. Is chicken considered white meat?
 - a. Yes
 - b. No
5. Is pork considered white meat?
 - a. Yes
 - b. No
6. Is lamb considered red meat?
 - a. Yes
 - b. No

Please fill out the information below:

1. What is your age?

2. What is your gender/sex?

3. What is your race?

Figure

According to gender

Among the 300 participants of the study, 155 were women and 145 were men. Of the 155 women, 148 (95.4%) said they eat meat whereas 32/155 women (20.6%) ate red meat > 4 times a week. 105 women (67.7%) considered pork as white meat compared to 77% of men who said yes to pork being white meat. Almost all men (144/145 = 99.3%) said they eat meat. 33.7% men ate red meat > 4 times a week. 60% of women and 64.1% of men preferred eating white meat over red meat.

According to age

We divided the participants' data into six age groups: < 50 years, 51 - 60 years, 61 - 70 years, 71 - 80 years, 81 - 90 years and > 90 years of age. Figure 1 and 2 show that majority of the subjects lied in the age range of 61-80 years. This age bracket also had the largest meat consumption. They also depict that younger people have less meat intake on average.

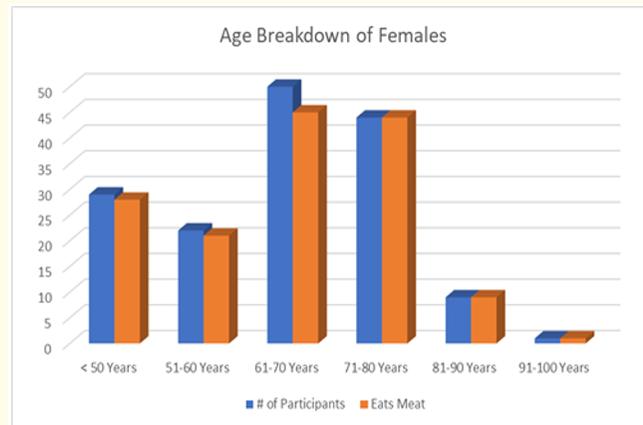


Figure 1

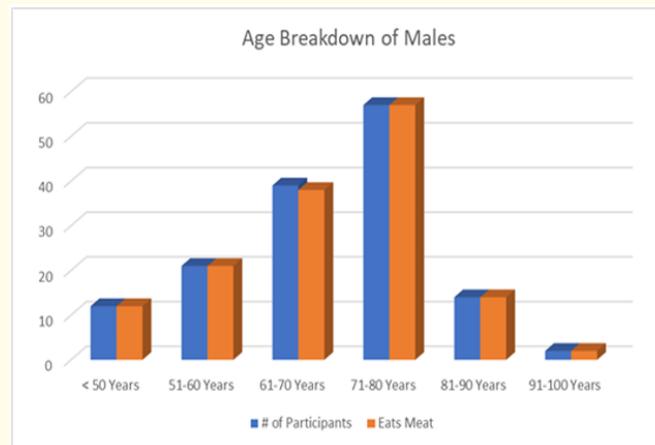


Figure 2

According to race

Figure 3 shows that the subjects belonged to four different races; White (81.6%), Black (9%), Hispanic (4%) and Asian (5.3%). Figure 4 tells us that 61% of white patients considered pork as white meat. This depicts that a major portion of population lives under the false belief of pork being the other white meat, further strengthening the need to educate people about the right dietary choices.

Attitude towards different types of meat

Knowledge of meat-related information was investigated with specific reference to the respondents’ perspective about meat being either red or white; food package labels and old-age advertisements were found to be an influential source of meat-related information (Figure 5). The study revealed that 70.3% (211/300) of the participants believed that pork is white meat. This belief that pork is the other

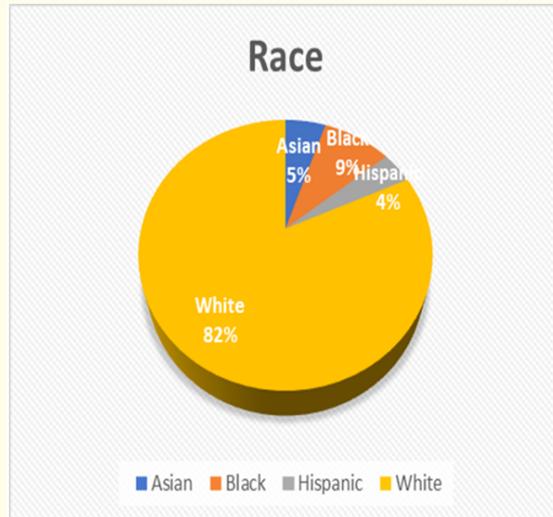


Figure 3

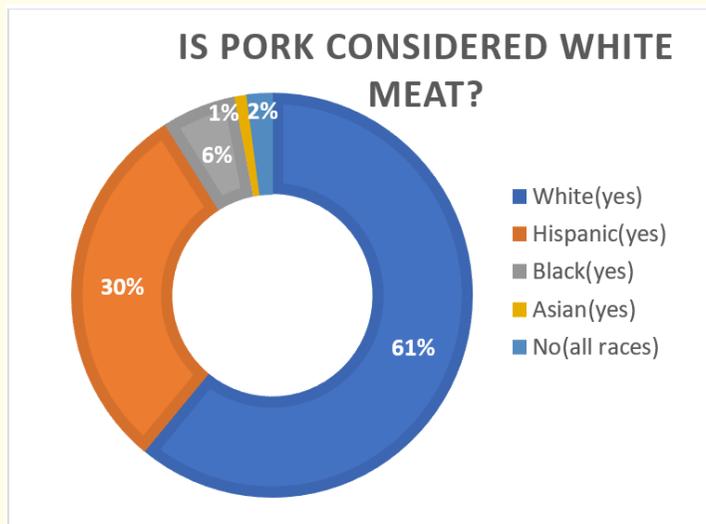


Figure 4

white meat, hence healthier, was associated with consuming more red meat and a greater frequency of processed red meat purchases eventually. Figure 6 shows that majority of patients who thought pork is white meat fell under the age group of 71 - 80 years.

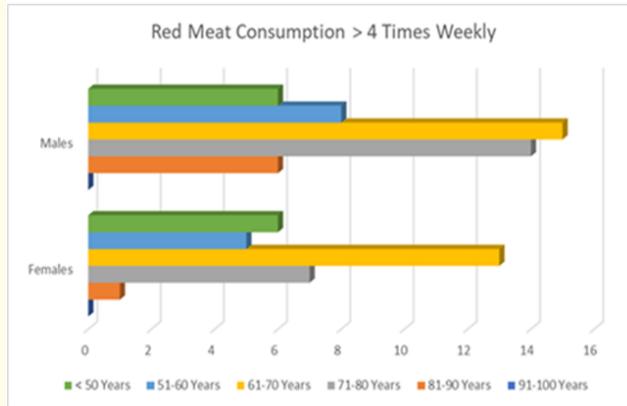


Figure 5

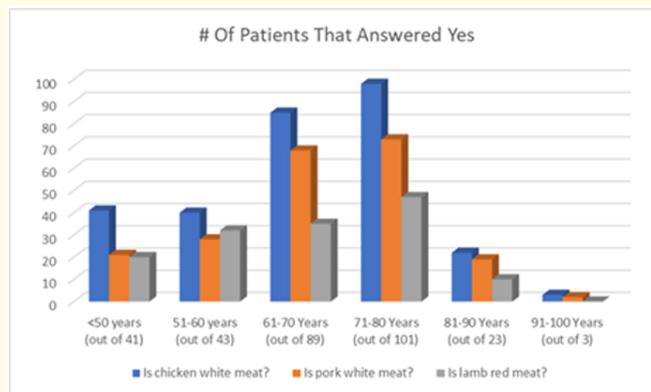


Figure 6

Discussion

Overall meat consumption has continued to rise in the USA and the rest of the developed world [13,16]. Despite a shift towards higher poultry consumption, red meat still represents the largest proportion of meat consumed in the USA (58%). Twenty-two per cent of the meat consumed in the USA is processed [13]. Throughout the world, both the global average per capita consumption of meat and the total amount of meat consumed are rising, driven by increasing average individual incomes and by population growth [8].

The term ‘red meat’ includes beef, veal, pork, lamb, and mutton. This type of meat has a high concentration of myoglobin, which in contact with oxygen transforms to reddish oxymyoglobin, makes myoglobin-rich meats appear red. Processed red meat (ham, sausages,

bacon etc.) means that it has undergone some form of treatment e.g. smoking, salting or the use of chemical preservatives and additives to improve its shelf life and/or taste. It usually contains much more sodium and nitrites/nitrates than unprocessed. Red meat and processed meat intake are significantly associated with higher mortality risk in both men and women. A very high incidence of diabetes and cardiovascular disease (stroke, heart failure) has been documented in processed red meat consumers [22]. It is not clear which components of red or processed meat contribute to the observed risk of cardiovascular disease, but abundance of branched amino acids, saturated fatty acids (SFAs), advanced glycation end-products (AGEs), nitrite, nitrate and nitrosamine, phosphatidylcholine and L-carnitine has been proposed.

Apart from the cardiovascular adverse effects, red meat consumption is also seen to be linked to carcinogenic effects [18-20]. There are multiple molecules present in red and processed meat with a potential carcinogenic effect on colorectal tissues. Processed meat is more carcinogenic compared to red meat because of the abundance of potent nitrosyl-heme molecules that form N-nitroso compounds. The non-human sugar molecule N-glycolylneuraminic acid may account for the carcinogenic effects of pork despite its heme content being comparable to that of chicken. Red meat products, especially those that have been processed, have a wide variety of carcinogenic molecule.

We evaluated how the knowledge and attitudes about types of meat and awareness of diet and health influences meat consumption [12,14,17]. A major issue when corroborating data is the fact that meat consumers are unaware of what is classified as white or red meat. White meat is known to be a better option to eat, but what many people do not understand is what truly is categorized as white or red meat. This may lead to large levels of meat consumption under the preconceived notion that it is white meat when it is red. The main difference is that white meat refers to poultry and fish, which is a leaner source of protein with a lower fat content and healthier option than red meat. The lack of knowledge on the distinctions between red meat and white meat has shown to be detrimental to a large majority of people's health today [6,9,10]. Further research has shown that most cardiac patients are in the 60-80 age range. People falling in this age group have shown to consume a large amount of red meat on a weekly basis. They also are the highest range who believes that pork is white meat. This is important to note due to the commercial on pork in the late 1980s in a campaign titled, "Pork. The Other White Meat". Patients who have seen this commercial were in the 30 - 50 age range at the time that it came out, meaning that they were not given much more information on this after viewing the advertisement, which led to several decades of having the same mindset. This misconception has led to a very large group of people to believe that pork meat is white, and not red meat. The misleading information on this topic has led to the consumption of pork by many under the false pretense that it is healthy and considered white meat. This is not supported by any evidence because from a nutritional standpoint, pork is classified as red meat because of the high levels of myoglobin it has that poultry/fish do not [7]. Furthermore, the physicians and the healthcare organizations in the US are not fully aware of this fact. Hence, this misconception is not adequately addressed by the healthcare community shrinking their efforts towards primary and secondary prevention of cardiovascular disease. The American Heart Association recommends a healthy balance in diet and physical experience as well as increasing awareness regarding cooking methods and avoiding processed meats [2]. However, these recommendations are often hard to follow for lower- and middle- income families because white meat is shown to have a higher price tag than red meat. Coincidentally, most of CVD patients come from lower- and middle-class backgrounds, showing a strong correlation between dietary habits and socioeconomic status. This creates an invisible glass barrier that this population has a difficult time overcoming due to the costly pricing of white meat and healthy, plant-based options [3].

Conclusion

In order to address public health concerns related to excess meat and/or protein consumption, practitioners, educators and researchers must appropriately use available data sources in order to accurately report consumption at the population level. Understanding the trends and factors that surround meat consumption in the US is a good indicator of what researchers need to be focusing on. This is because the rate of meat consumption is 3 times higher than the global average, so focusing on the statistics of this population will help reduce the world-wide issue of cardiovascular disease risk. The data collected has shown that there are many misconceptions surrounding the differences between red meat and white meat. We strongly recommend further research and an increase in awareness campaigns to change these skewed views of unhealthy dietary habits, particularly amongst the high-risk population, impacting the overall cardiovascular morbidity and mortality.

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