

**HEALTH LITERATURE REVIEW:  
HOW EFFECTIVE ARE DIETARY APPROACHES TO STOP  
HYPERTENSION (DASH) DIET IN CONTROLLING  
HYPERTENSION?**

**Word count: 8200 approx**

## **Abstract**

The proposed study evaluates the effect of the DASH diet in controlling hypertension. The background information evaluates that not having a proper diet is one of the many causes of heart diseases such as hypertension. The rationale supports that fact by identifying worldwide heart disease occurrences. For a focussed completion of the study detailed aim and objectives have been set up to ensure the start of the right direction of the proposed literature review to be undertaken. In view of addressing the established PICO question for the study, a holistic search process has been undertaken along with relevant keywords, Boolean operators and syntax. It has involved a combination of databases with constructive inclusion and exclusion factors and quality appraisal tools for relevant outcomes.

The third chapter discusses the results found in the objectives. Saturated fat has certain chemical features, which are generally solid at “room temperature”. Healthy fats benefit the body by such things as controlling inflammation as well as maintaining the cells. Unsaturated fats that are liquid at the “room temperature” have been considered beneficial fats as they could develop cholesterol levels, stabilise heart rhythms, as well as play other major beneficial roles. The DASH diet has limited food, which is too high in overall saturated fats like fatty meats as well as full-fat dairy products. In terms of recommended dietary strategies, Mediterranean diet has been identified to be highly beneficial in preventing heart diseases and hypertension. Additionally, studies have also shown that a vegan diet is highly useful in controlling cardiovascular health ailments.

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STUDENT LIFE

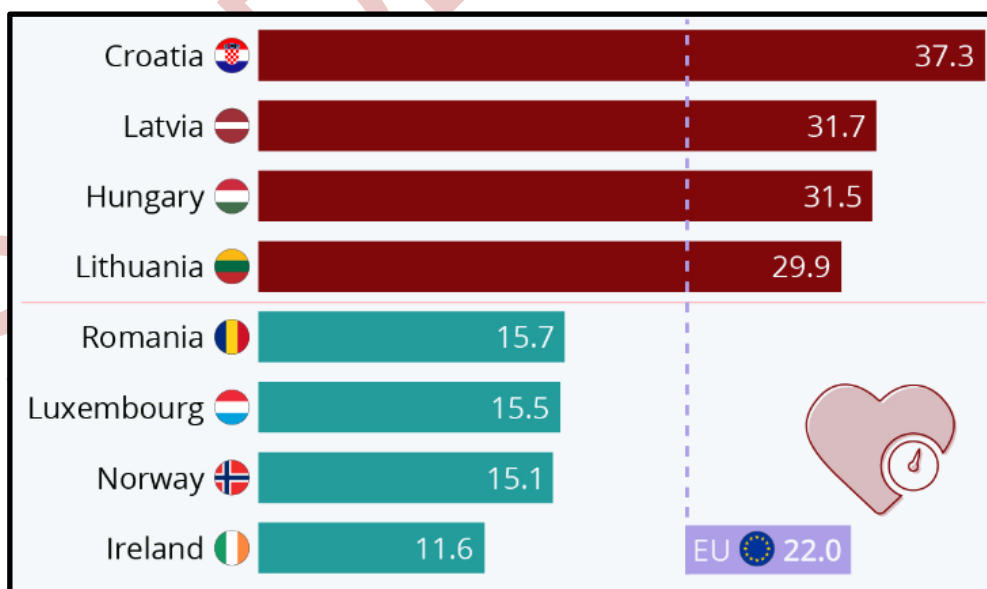
## Chapter 1: Introduction

### 1.1 Introduction

Hypertension occurs when the pressure of the blood vessels in the body becomes too high. A general pressure exceeding 140/90 mmHg can be considered as high blood pressure and can be the sign of Hypertension. It is generally caused by tightening of the walls of the blood vessels due to gathering of fat in the inner walls. Gathering of fat is a direct effect of an unhealthy diet. Therefore, the imbalance of diet can be one of the causes of Hypertension. This dissertation will evaluate all possible causes of hypertension and will evaluate if an effective diet can rescue the symptoms of the same.

### 1.2 Background

According to the World Health Organisation (WHO), an unhealthy diet and physical inactivity contributes to about 30% of the cases of morbidity due to hypertension prevalence. Thus, the cause of fat collection into the inner walls of the blood vessels is not only unhealthy diet, but also lack of exercising. Excessive intake of trans fatty acids and saturated fatty acids, along with a higher concentration of sugar and salt in diet are known to be the risk factors of most cardiovascular diseases (Jagannathan, 2019). Thus, proper diet is an essential part of maintaining a healthy nutrient balance in the body that may prevent said diseases. However, several factors outside just a healthy diet play a role in cardiovascular disease prevention.



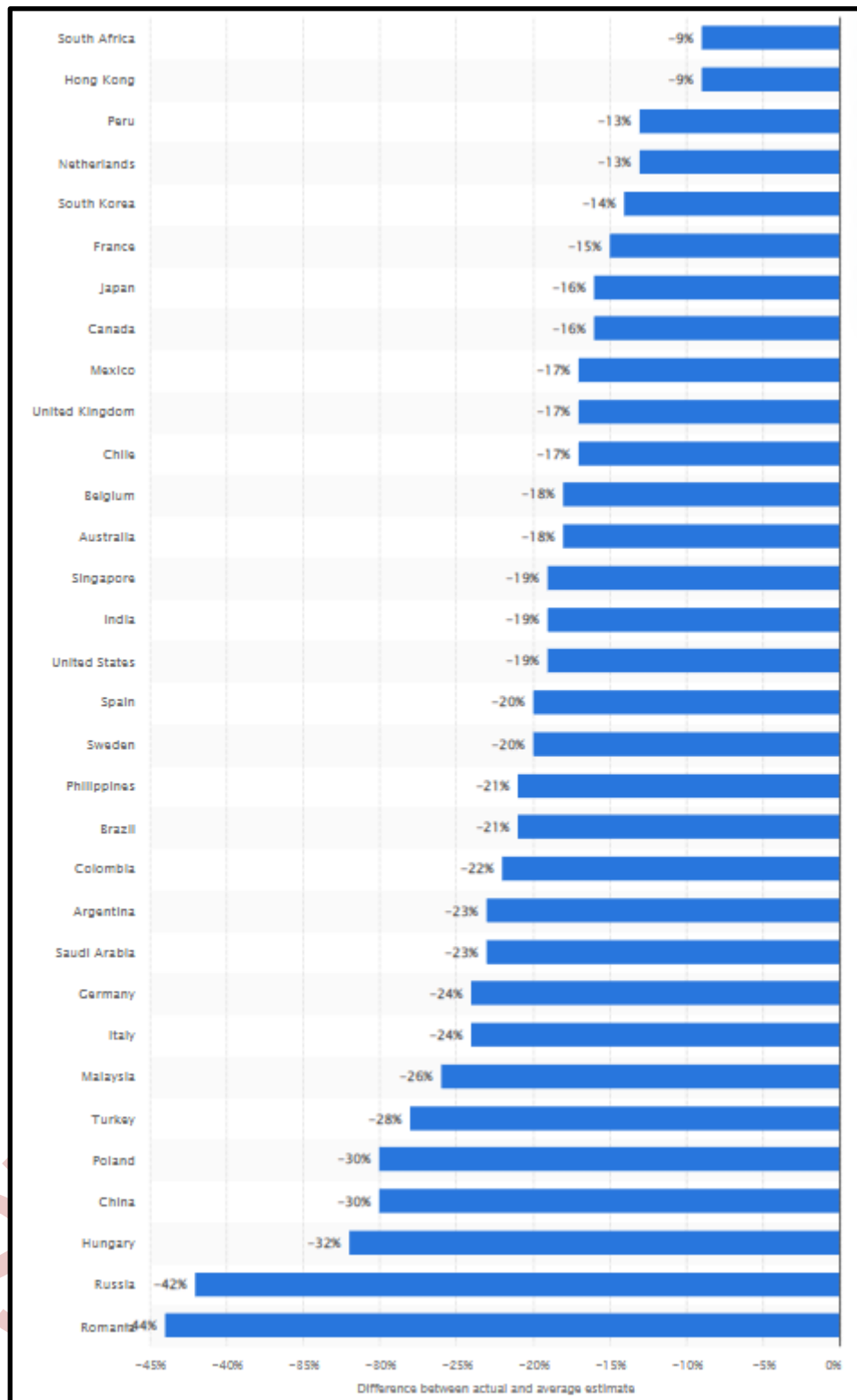
**Figure 1.1: EU hypertension rate by country**

(Source: Statista.com, 2023)

An European hypertension statistics by country in 2019 suggests some countries having a significant rate of such diseases. Figure 1.1 shows these countries include Croatia, Latvia, Hungary and Lithuania. The rate of the same in countries such as Romania, Norway and Ireland are less. The EU has an average of 22 people suffering from hypertension out of 100 individuals (Statista.com, 2021). While temporary rise in blood pressure can be of no serious issue, a permanent high blood pressure and sudden spikes can lead to multiple organ failure. Sudden spikes in blood pressure can lead to failure of heart, brain and kidney, disabling their functions.

### **1.3 Rationale**

The main problem that should be discussed in the research is, if proper diets or DASH can actually rescue high blood pressure in a permanent manner. Diet is no doubt an essential part of fat intake in the body and body fat is partially responsible for Hypertension. Research done by National Library of Medicine of USA, investigates global fat intake statistics. According to the statistics Australia and New Zealand were at second place in intaking trans fatty acids and saturated fatty acids. Africa, America and Asia were at third, fourth and fifth place respectively (Ncbi.nlm.nih.gov, 2023). Europe however was at 14th place in global fat consumption statistics. If consumption of fat can lead to hypertension, the reduction of fat through diet may also reduce the risks.



**Figure 1.2: Difference of estimated and actual heart disease related deaths by country**  
(Source: Statista.com, 2023)

A comparison of actual and average public estimation of percentage of deaths resulting from heart diseases, done in 2019 suggests that, there has been less than estimated level of deaths due to cardiovascular diseases. Figure 1.2 suggests that South Africa and Hong Kong based

heard disease related deaths come very close to their actual estimates. Similarly, death rates are significantly less than estimations in case of countries such as Belgium and Australia. Thus, there has been a difference spotted between estimated deaths and actual deaths. This research will thus also investigate how likely a person is to face death due to such diseases and what is the degree of prevention that can be achieved through a DASH diet.

#### **1.4 Aims and objectives**

The main aim is to understand the extent of which a DASH diet can control and prevent hypertension. Thus, the objectives include:

- To examine the effect of trans fat in creating heart diseases such as hypertension.
- To evaluate the level of saturated and unsaturated fat in a diet for controlling hypertension.
- To understand proper nutrients of a dash diet that can control hypertension.
- To recommend upon possible solutions on improving diet to prevent hypertension.

#### **1.5 Research questions**

- How saturated and unsaturated fat present in a diet can create hypertension?
- What is the limit of presence of saturated and unsaturated fat in a diet for controlling hypertension?
- What are the proper nutritional levels of a DASH diet?
- How can a DASH diet help in controlling and preventing hypertension?
- What can be recommended to improve the DASH diet to make it healthier?

#### **1.6 Significance of the research**

In a specific consideration, the research subjects a very common yet deadly health matter which is hypertension. Being so common in, the topic needs to be thoroughly evaluated based on its prevalence, cause and prevention techniques. The current research focuses on a particular and possible prevention, which is the maintenance of a healthy DASH diet and its effects. Considering the statistics of countywide deaths globally, it is immensely essential to engage in such a topic. This will result in a better knowledge generation of a healthy DASH diet which can be shared to prevent further deaths.

### 1.7 Research framework

The framework used in this will be Population, Intervention, Comparator, Outcome (PICO) framework. This will be helpful in structuring and answering the arose questions for the intention-based evaluation of the DASH diet.

|              |                                     |
|--------------|-------------------------------------|
| Population   | Hypertension patients               |
| Intervention | DASH diet                           |
| Comparator   | None                                |
| Outcome      | Effective control of blood pressure |

(Source: Self-Developed)

## Chapter 2: Methodology

### 2.1 Introduction

Methodology serves as a crucial parameter in research studies as a way of obtaining significant information for backing the conclusions drawn. In light of the PICO question established in this research subject, the following chapter is focused on illustrating the methods undertaken for selection of relevant information. Given this research study intended at getting out a literature review, this particular methodology section is intended to highlight the strategies used for collection of desired sources. It is aimed at illustrating the undertaken search processes along with screening and inclusion factors for abiding by authenticity and credibility of the outcomes.

### 3.2 Search Strategy

Literature search is expensively done for identifying appropriate methodology and design for conducting a study along with scope for measuring techniques in concepts of analysis. Li *et al.* (2019) stated that literature reviews aim at collection of empirical evidence that can align with pre-specified eligibility criteria concerning a certain research context. In this matter, the following research study has made a considerable search attempt by a combination of databases to gather relevant information. It is also identified by Salvador-Oliván *et al.* (2019) that careful planning concerning a search strategy is pivotal for enhancing the quality by eliminating possible errors. Relevant to this, the particular health literature review has addressed potential search techniques like free-text facets and controlled languages in accordance with associated keywords. Some of the considerable keywords used for this subject are “Trans”, “Fat”, “Heart Diseases”, “Hypertension”, “Saturated”, “Unsaturated”, “Levels”, “Nutrition”, “DASH”, “Nutrients”, “Diet”, “Recommendations” and associated terms.

Referring to this, application of potential keywords as part of the search process often includes using Boolean operators for desired search phrases. Bramer *et al.* (2018) noted that this often involves the application of search syntax prior to involving search terms towards creation of a complex and comprehensive strategy with diverse interfaces. Therefore, the following health literature review has developed a search strategy with the use of Boolean operators like “AND”, “OR”, and “NOT”. According to Hollier (2020), “AND” helps with indicating two or more terminologies to be present in the results and thereby connecting them. On the contrary, “OR” helps in broadening the search as it focuses on concepts that get

represented by two or more distinct terminologies. Eventually, “NOT” is a potentially challenging operator that has helped this research subject to choose sources with caution. All the three boolean operators have positively contributed towards developing effective search phrases to address each of the aforementioned objectives for this health literature review.

A relevant search attribute undertaken for this research subject is as follows -

| Objectives                                            | Search Phrases                                                                                                                                                                          | Results Obtained | Hits Made |
|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------|
| 1                                                     | “Trans” AND “Fat” AND “Heart Diseases” AND “Hypertension” OR “High Blood Pressure” NOT “Arrhythmia” NOT “Angina” NOT “Heart Failure”                                                    | 21               | 10        |
| 2                                                     | “Saturated” AND “Unsaturated” AND “Levels” AND “Fat” AND “Nutrition” AND “Heart Diseases” AND “Hypertension” OR “High Blood Pressure” NOT “Arrhythmia” NOT “Angina” NOT “Heart Failure” | 15               | 10        |
| 3                                                     | “DASH” AND “Nutrients” AND “Diet” AND “Heart Diseases” AND “Hypertension” OR “High Blood Pressure” NOT “Arrhythmia” NOT “Angina” NOT “Heart Failure”                                    | 11               | 9         |
| 4                                                     | “Recommendations” AND “Nutrients” AND “Diet” AND “Heart Diseases” AND “Hypertension” OR “High Blood Pressure” NOT “Arrhythmia” NOT “Angina” NOT “Heart Failure”                         | 10               | 6         |
| <b>Total Sources to be Used for the PICO Question</b> |                                                                                                                                                                                         | <b>57</b>        | <b>35</b> |

**Table 2.1: Search Process for the Literature Review**

(Source: Self-Created)

## 2.3 Database Selection

In terms of conducting a literature review, searching potential references requires compliance with a range of databases and database platforms. Conversely, Bramer *et al.* (2017) established that database searching can be often laborious and time-consuming given the database-specific approach of syntaxes. On this note, using many databases paves the way for meeting minimum requirements that can be subject to guaranteeing adequate and efficient coverage. Concerning this health literature review, selection of databases has involved PubMed or MEDLINE, and CINAHL. A major advantage for using PubMed as a database is its appearance as a free resource that supports the searching and retrieval of potential life sciences and biomedical literature (Sayers *et al.* 2021). The following database maintains the aim of significant improvement in health on both personal and global scale. A relevant reason for choosing PubMed database concerning this health literature review has been its hold over more than 35 million abstracts and citations concerning biomedical literature.

Growth concerning PubMed Central (PMC) along with public access mandates have substantially impacted the composition of this database. Williamson and Minter (2019) posited that different scopes of PMC with MEDLINE, as another database, is expected to be continuing and affecting their overlap. However, existing quality control concerning the facilitation and maintenance of both resources along with funding from relevant grantors serves as a potential source of quality assurance for literature reviews. It is also argued by Sayers *et al.* (2021) that a significant limitation concerning PubMed as a database is the absence of full text journal articles. Yet again, links concerning the full text are often made available that are parallelly accessed from other sources like PMC or the publisher's website. In this regard, clarifying the obtained findings from submit with another database has enabled scope for this literature review towards maximising the available data and considering relevant literature.

In this view, the CINAHL database has helped as another potential source for identification of significant information relevant to this literature review. Hopia and Heikkilä (2020) opined that strategic planning leverages scope for examining forthcoming healthcare research systematically while finding areas that require further studying. Concerning the development of a relevant, applicable, and current healthcare resource strategy, research priorities require being nationally, internationally, and locally established. However, identification of such healthcare research priorities on distinct levels often tend to be challenging and is thereby assisted by the CINAHL database. Outcomes from this database, in collaboration with

findings from PubMed, have effectively contributed towards a scoping review of the Literature concerning required nutrition for controlling hypertension.

## **2.4 Inclusion and Exclusion Criteria**

In coordination with the established PICO question for this health literature review, involvement of inclusion and exclusion facets have proved substantially beneficial. The following factors are identified to be considerably beneficial as a help in setting binary regarding literature reviews along with maintaining an appropriate and determined approach. As put forward by Mohamed Shaffrilet *al.* (2021), literature reviews required a significantly methodological attribute concerning the need for meeting required issues regarding less suitability. In this regard, a leading inclusion factor undertaken for this research subject is making certain that all the chosen resources are published in the last 6 years, namely from 2018 through 2023. Sources beyond this span are significantly excluded from this literature review to avoid depending on bygone data for drawing conclusions. This is accompanied by another leading parameter for inclusion being only choosing academic sources that have complete access.

Sources gathered are made certain to be fully accessible either from the aforementioned databases or from associated platforms. However, articles that required a paid approach for having complete access were significantly excluded from being part of this health literature review. Hornberger and Rangu (2020) pointed out that narrowness concerning the inclusion and exclusion principles directly impacts feasibility of a study. This is in correlation with a significant impact of the inclusion factors on integrity of collected data. Referring to this, another major inclusion factor focused on for this health literature review is choosing sources only focusing on hypertension or high blood pressure as the key biological aspect. Academic sources emphasising hypotension, heart failure, heart attack, angina, arrhythmia, or other heart conditions and required nutritional levels are substantially avoided. Besides, articles making a significant emphasis on the DASH diet for controlling hypertension are only included while avoiding sources focusing on other dietary types.

The following health literature review will also include a substantial inclusion aspect in terms of choosing academic articles that have undergone randomised control trials (RCTs). This is concerning the aspect that RCTs serve as relevant attributes for determining new interventions relevant to healthcare studies (Hariton and Locascio, 2018). A detailed characterization of the inclusion and exclusion attribute undertaken as part of identify relevant nutritional level and diet for controlling hypertension is as below -

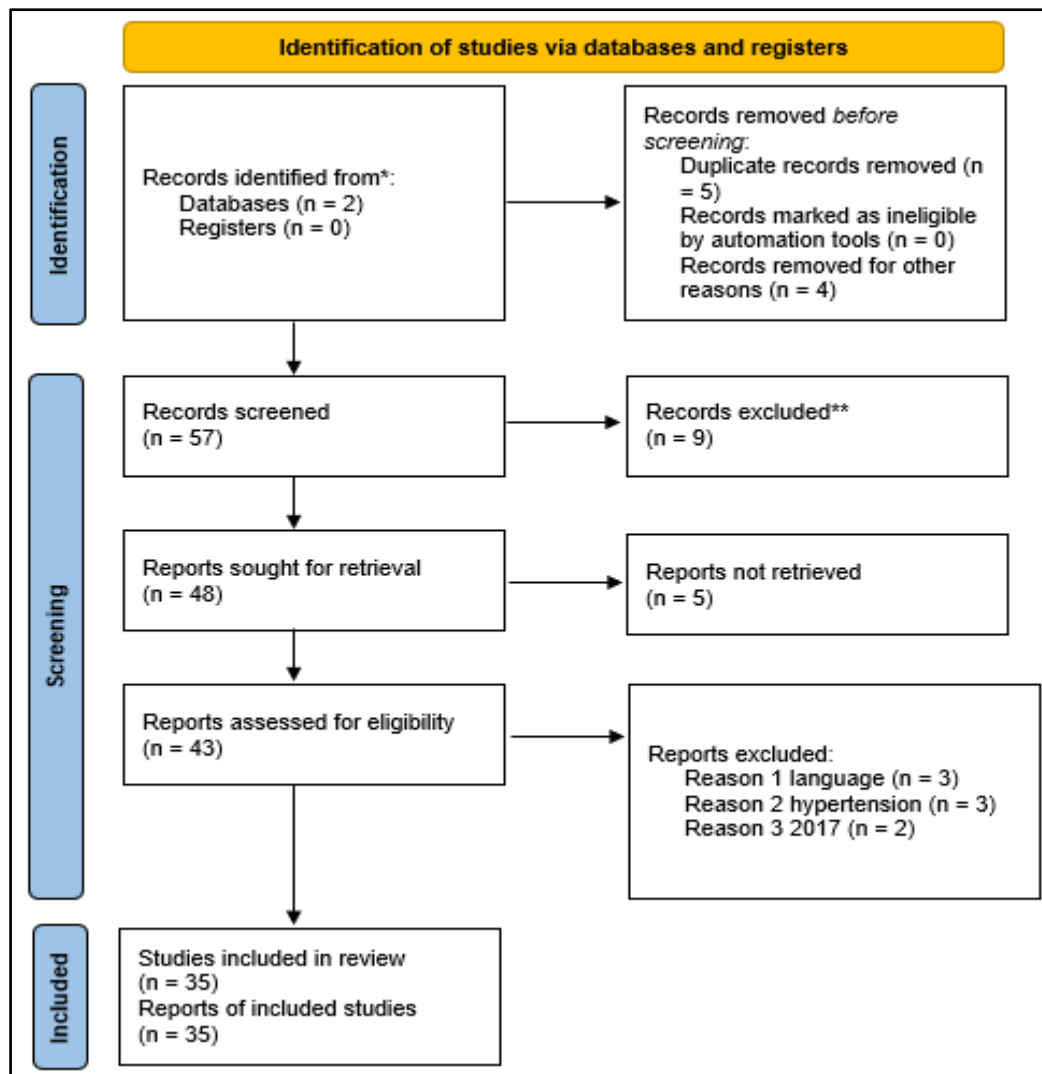
| Inclusion Features                                                                             | Exclusion Features                                                                                                |
|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Sources that have been published since 2018 through 2023.                                      | Sources published beyond this span are excluded for avoiding bygone information.                                  |
| Articles with complete access, directly from the databases or other platforms, are only chosen | Articles that require paid access have been significantly excluded.                                               |
| Articles with a sole focus on hypertension and required nutrition levels are only included.    | Articles emphasising other health or heart conditions and other dietary solutions are excluded.                   |
| Studies conducted with RCT design have only been included.                                     | Studies conducted with the focus on other forms of research designs are excluded.                                 |
| Academic sources published in English have only been included.                                 | Academic sources published in other languages have been excluded.                                                 |
| Sources that have already been published under trusted journals are included.                  | Sources that are yet to be published and currently part of Master's thesis or Doctoral dissertation are excluded. |

**Table 2.2: Selection Attributes for the Literature Review**

(Source: Self-Created)

## 2.5 Data Screening and Extraction

Determined from all the inclusion and exclusion factors along with the chosen data bases for the study, it has accounted for a holistic screening for choosing the required articles for this review. Polaninet *al.* (2019) contended that screening abstract is highly significant for carrying out a high quality and comprehensive literature review. In this context, screening of the desired sources chosen for this health literature review has involved initiation with screening the abstract and accordingly choosing them. This has been diligently accompanied by addressing the other parameters mentioned earlier as part of the inclusion and exclusion factors. The overall screening and subsequent extraction of the desired sources has resulted in collecting the information as illustrated with the PRISMA flowchart below.



**Figure 2.1: PRISMA Flow Diagram**

(Source: Self-Created)

## 2.6 Data Analysis

Conducting a data analysis is a significant importance in research as it helps in converting the collector information into the form of a story or relevant theme for addressing the established PICO question. Data analysis positively contributes towards summarising collected information and adequately interpreting the same with the help of logical reasoning for determination of patterns or trends. Following the major focus of this research study to carry out a significant literature review, “critical appraisal skills programme (CASP)” tool is used. As per the views of Long *et al.* (2020), CASP tool emerges as a prominent quality appraisal tool concerning health related qualitative synthesis of evidence. The following has helped in promoting scope for all the collected information to be systematically assessed as a way of securing relevance, results, and trustworthiness of the published articles.

## **2.7 Study Quality and Risk of Bias**

Concerning the focus of this health literature review to have a systematic approach, it holds the potential risk of buyers in terms of systematic errors or deviation from truth. This can also be accompanied by a lack of appropriate approach towards finding evidence that can result in systematic flaws. Ali and Usman (2018) asserted that reliability concerning a literature review tends to be largely dependent on the rigour of attempt regarding identification, appraisal, and aggregation of evidence. Henceforth, compliance with the CASP tool and Cochrane strategies have contributed towards analysing the impact score of each of the chosen articles for abiding by credibility of the collected information.

## **2.8 Summary**

Through the following chapter, it can be determined that methodology tends to be substantially effective in literature review owing to its dependence on complete secondary information. It is deduced that the aforementioned search processes with the applied keywords, syntaxes, and Boolean operators have positively contributed in selection of academic sources to address the established PICO question. The following chapter has also inferred that the undertaken inclusion and exclusion factors along with a diligent screening attribute has made a considerable contribution towards reliability and validity of the information. In conclusion, the mentioned risk appraisal attribute has also made certain that all the chosen sources comply with authenticity for significant impact on the derivations made.

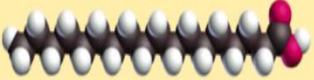
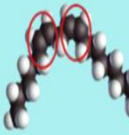
## **Chapter 3: Results**

### **3.1 Introduction**

The result of the research has documented every significant finding of the methodology. Conclusions and results of the secondary method have been mentioned here and it provides an insight into the specific way that research was pursued. This chapter is done by incorporating the research objective with proper discussion. All four objectives have been demonstrated here using appropriate and trustable sources. This is a very important chapter based on the analysis conclusion of this research and it can be drawn perfectly.

### **3.2 Concept of Saturated and Unsaturated (Trans) Fats and Their Contribution towards Hypertension**

Consuming food is high in Tran's fats which causes the build of fats in the human body, especially blood vessels and arteries. According to Otenget *al.* (2020), excess fat in arteries has prevented the blood vessels from expanding and contracting normally which leads to high blood pressure. Saturated fats that include a type, which is called Trans fat, have always tended to stay strong and could be the cause of fatty deposits in the overall blood vessel. It leads to atherosclerosis (that is "hardening of arteries") (Mir *et al.* 2021). In contradiction, the unsaturated fats have stayed as liquid at "room temperature" as well as these are likely to clog the arteries of the human body. Saturated fat has certain chemical features, which are generally solid at "room temperature" (Schilliger, 2022). Most of the saturated fats come from the food products of animals. But few plant oils like coconut and palm oil contain high levels. Moreover, eating this saturated fat has enhanced the cholesterol level in the blood and the risk of heart disease.

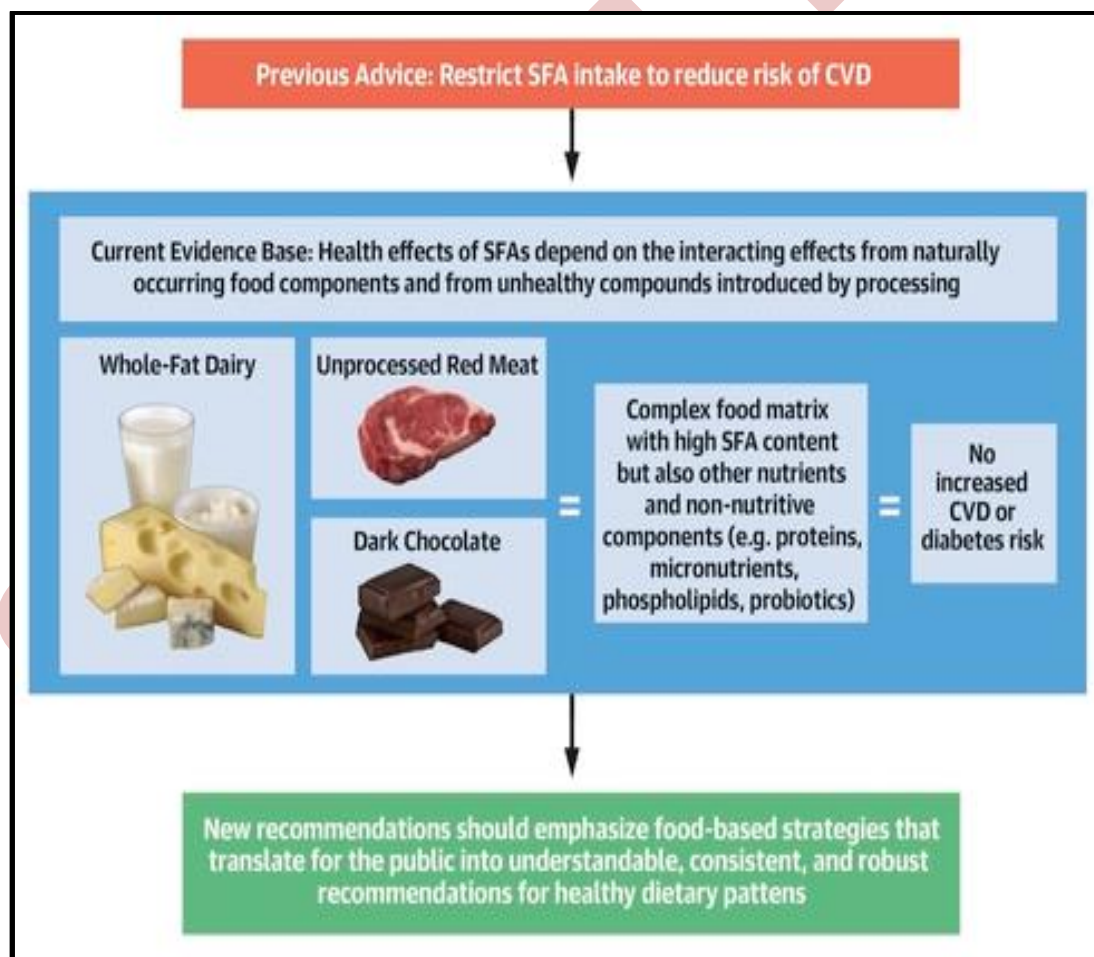
|  <b>Type of Fatty Acids</b>                                                                                                                                                                            | <b>Example of Sources</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>Health Impacts and Intake Recommendations</b>                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Saturated</b>  <ul style="list-style-type: none"> <li>• No Double Bond</li> <li>• Straight Structure</li> <li>• Solid at Room Temperature</li> </ul>                                                |    <p>Red Meat      Dairy Products (Eg. Cheese)      Coconut Oil</p>                                                                                                                                                                                                                                                                                                     | <ul style="list-style-type: none"> <li>• Increased Risk of Heart Disease</li> <li>• Less than 20gm of Saturated Fats Per Day (for a 2000 kcal diet)</li> <li>• Raises both LDL and HDL</li> <li>• Increases Total Cholesterol</li> </ul>  |
| <b>Trans</b>  <ul style="list-style-type: none"> <li>• One or More Double Bonds in Trans Configuration</li> <li>• Straight Structure</li> <li>• Semi-Solid/Solid at Room Temperature</li> </ul>        |    <p>Margarine      Cream Soup with Puff Pastry      Chicken Pie</p>                                                                                                                                                                                                                                                                                                    | <ul style="list-style-type: none"> <li>• Increased Risk of Heart Disease</li> <li>• Less than 2.2gm of Trans Fats Per Day (for a 2000 kcal diet)</li> <li>• Raises LDL (Bad) and Lowers HDL (Good)</li> <li>• Increase Risk of Stroke and Diabetes</li> </ul>                                                                |
| <b>Monounsaturated</b>  <ul style="list-style-type: none"> <li>• One Double Bond in cis Configuration</li> <li>• Bent Structure</li> <li>• Liquid at Room Temperature</li> </ul>                       |    <p>Olive Oil      Canola Oil      Avocado</p>                                                                                                                                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• Moderate intake reduces risk of Heart Disease</li> <li>• Lowers LDL (Bad) and Raises HDL (Good)</li> </ul>                                                                                                                                                                          |
| <b>Polyunsaturated</b>  <ul style="list-style-type: none"> <li>• Multiple Double Bond in Cis Configuration</li> <li>• Even more "bent" in Structure</li> <li>• Liquid at Room Temperature</li> </ul> | <div> <div> <b>Omega-3 (ALA, DHA, EPA)</b>    </div> <div> <b>Omega-6 (Linoleic Acid)</b>    </div> </div> | <ul style="list-style-type: none"> <li>• Moderate intake reduces risk of Heart Disease</li> <li>• High Omega-3 to Omega-6 ratio is good for reduced heart disease &amp; anti-inflammation</li> </ul>                                                                                                                         |

**Figure 3.1: Type of fatty acids**

(Source: Influenced by Di Palo and Barone 2020)

Monounsaturated fats could be found in nuts, avocados, olives, seeds, and olive oils. However, Polyunsaturated fats could be found in corn, sunflower, flaxseed oil, and soybean oil, walnuts, fish, and flax seeds (Mir *et al.* 2021). Healthy fats benefit the body by such things as controlling inflammation as well as maintaining the cells. As cited by Harcombe (2019), this is possible by consuming more fats that include healthy and unsaturated fats. Consuming saturated fat has decreased lipoprotein levels in the bloodstream as well as enhanced the “good” cholesterol. However, the overall impact is a development of the risk factor of heart disease. On the other hand, unsaturated fats could assist to develop the cholesterol level by mitigating bad cholesterol (Di Palo and Barone 2020). The low level of cholesterol could as well help to mitigate heart disease risks. The high saturated fats level and high cholesterol level may contribute to enhancing the blood pressure by enhancement of plaques in the vessel walls those results in decreasing of its elasticity and diameter.

Dietary fat as well contributes to blood pressure elevation and enhances the stroke risk as well as coronary artery risk. Eating more saturated fats in the diet could raise the bad cholesterol in the blood of the human body which could also increase stroke and heart disease risks (Rossi *et al.* 2020). Dietary intake of different fats may have various impacts on blood pressure. As per the view of Unger *et al.* (2019), people conducted a prospective cohort for examining the actual association between intake of the individual and subtype fatty acid. In terms of understanding various dietary roles in the enhancement of hypertension, people conduct the prospective analysis in a large cohort to investigate the association of saturated fats. The voltage-gated Ca (2+) and its current density have enhanced significantly in overall hypertension that could be affected by fatty acids (Schilliger *et al.* 2022). High saturated fat and cholesterol; intake is associated with increased blood pressure, while DHA is an “antihypertensive agent” (Tziomalos, 2020). Decreasing saturated fat of not over 6% calories as well as total fat of 27% of everyday calories could be perfect for a human body to reduce high blood pressure.

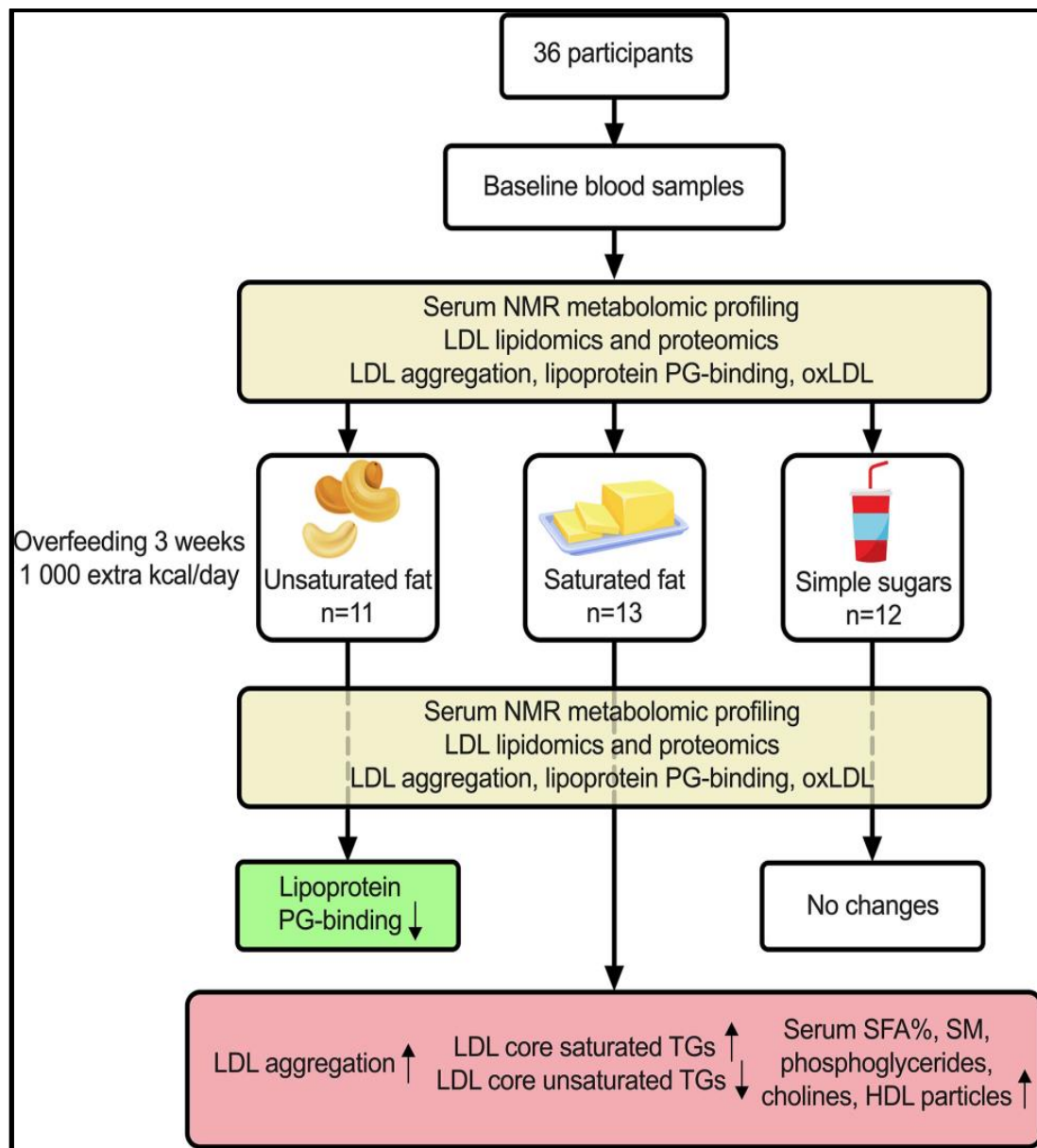


**Figure 3.2: Health and saturated fats**  
(Source: Influenced by Unger *et al.* 2019)

Oily fish like trout, salmon, and mackerel are rich in unsaturated fats called “Omega-3 fatty acids” that as well assist to control overall blood pressure. Unsaturated fats are considered beneficial fats as they could develop the level of blood cholesterol, ease inflammation, as well as play some other beneficial roles (Dos Santos and Fleming, 2020). Moreover, a high intake of monounsaturated fat might raise the high-density of “lipoprotein cholesterol” as well without raising the “low-density of lipoprotein cholesterol”. However, saturated fats mainly tend to stay solid as well and could be the cause of fatty deposits in entire “blood vessels”. On the other hand, the unsaturated fats are staying as the liquid at proper “room temperature”, which is less likely for clogging the arteries of every human body (Gouarefet *et al.* 2020). With saturated fats, Trans fats as well tend to enhance the bad cholesterol in human blood, but these as well tend to decrease the good cholesterol. This is the reason that trans fats are damaging human health as well as it could enhance the cardiovascular disease risk (stroke and heart disease).

### **3.3 Suggested Levels of Saturated and Unsaturated (Trans) Fats for Controlling Hypertension**

The unsaturated fats have incurred several health benefits like reducing inflammation and developing cholesterol and lipid profiles. All these promote longevity and reduce cardiovascular disease risks. The Dietary Guidelines of WHO (World Health Organisation), as well as the dietary reference, has been recommended to recommend overall fat intake between 20 and 35% of entire calories (Liu *et al.* 2017). At least 20% of the fat has ensured the total energy and its adequate consumption, fat-soluble vitamins, and necessary fatty acids, and prevent atherogenic dyslipidemia which also occurs with much less fat and high carbohydrate. Moreover, the maximum of 35% fat was regarding limiting “saturated fat” as well as the observation that an individual on a high-fat diet has consumed more calories than is resulting from weight gain (Downer *et al.* 2020). Unsaturated fats that are liquid in the “room temperature” have been considered beneficial fats as they could develop cholesterol level, stabilise heart rhythms, as well as play other major beneficial roles. There are generally two types of “unsaturated fats” that are good for health: Monounsaturated fats and Polyunsaturated fats.



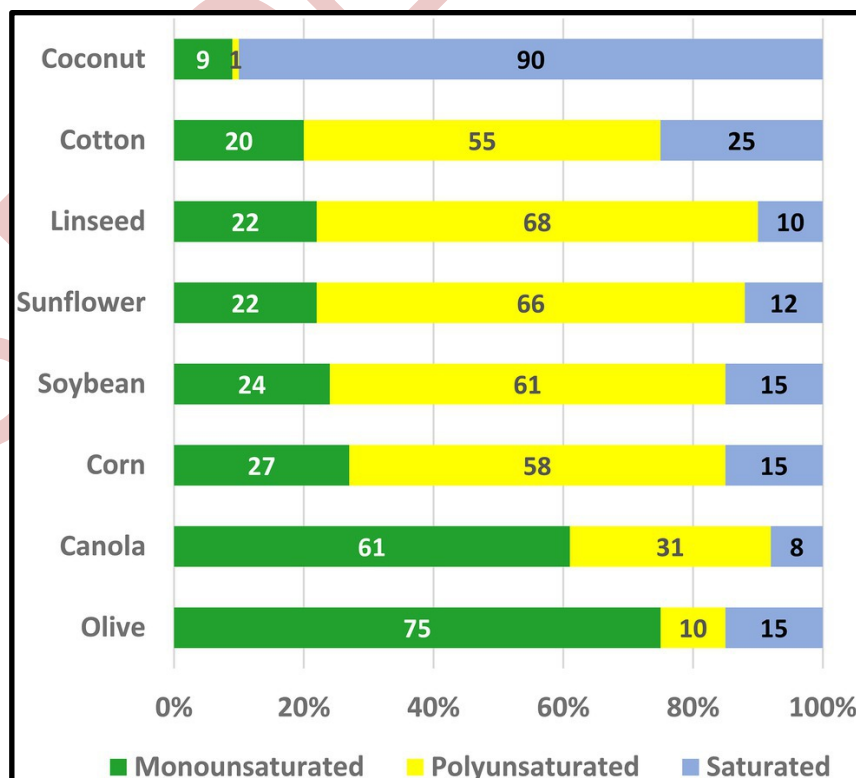
**Figure 3.3: Overfeeding saturated fats enhance the density of lipoprotein**

(Source: Influenced by Lucaet *et al.* 2022)

Most people do not eat sufficient and healthful “unsaturated fats”. Every food that contains fat has a mix of particular fat types. As per the view of Luca *et al.* (2022), even healthy foods such as nuts and chicken have very little saturated fat. However, the dietary guidelines have recommended getting less than 10% of calories every day from “saturated fats”. Decrease the saturated fat that is not over 6% of every day calories and the overall fat to around 27% of everyday calories (Medlineplus, 2022). Moreover, the products of “low-fat dairy” have appeared to be particularly beneficial to less systolic BP. Eating more saturated fat is very dangerous for human health. It should be avoided with high “saturated fat” food (over 20% of the fat) (Islam *et al.* 2019). For people, who particularly need to reduce their cholesterol, it

has been recommended to decrease saturated fats to less than 6% of everyday calories. It should aim to get not over 10% of everyday calories from saturated fat (that is found in butter, meat, and cheese) (Rogers *et al.* 2022). However, for 2000 calories of diet, the required food is a total of 200 calories or around 22 grams daily.

The Mediterranean diet has been reported to decrease the risk of cardiovascular disease. A crucial characteristic of this kind of diet is the high energy proportion from the “monounsaturated fatty acids” that are generally from “olive oil”. On the other hand, Curcio *et al.* (2020), asserted that “polyunsaturated fatty acids” have been included in “omega-3 and omega-6 fats”. All these are necessary fatty acids, which the human body has required for brain development. Intake of “monounsaturated fatty acids” and its dietary, particularly the oleic acid from the source of vegetables may contribute to controlling and preventing the adverse “BP level” (Islam *et al.* 2019). In terms of high BP, the health care system examines the patients and asks about their medical history and symptoms. The healthcare provider also listens to the heart by using a stethoscope. A high BP has been diagnosed if the BP reading is similar to or much greater than 130/80 mm Hg. In the opinion of Oteng *et al.* (2019), it is important to follow the diet for preventing hypertension or any high blood pressure disease. It should aim to eat less than 6 grams of salt in a day. Eating low-fat food includes fibre such as pasta and bread, wholegrain rice, as well as plenty of vegetables and fruit. These also help to decrease high blood pressure.



### Figure 3.4: Approaches to reduce saturated fats

(Source: Wallis *et al.* 2022)

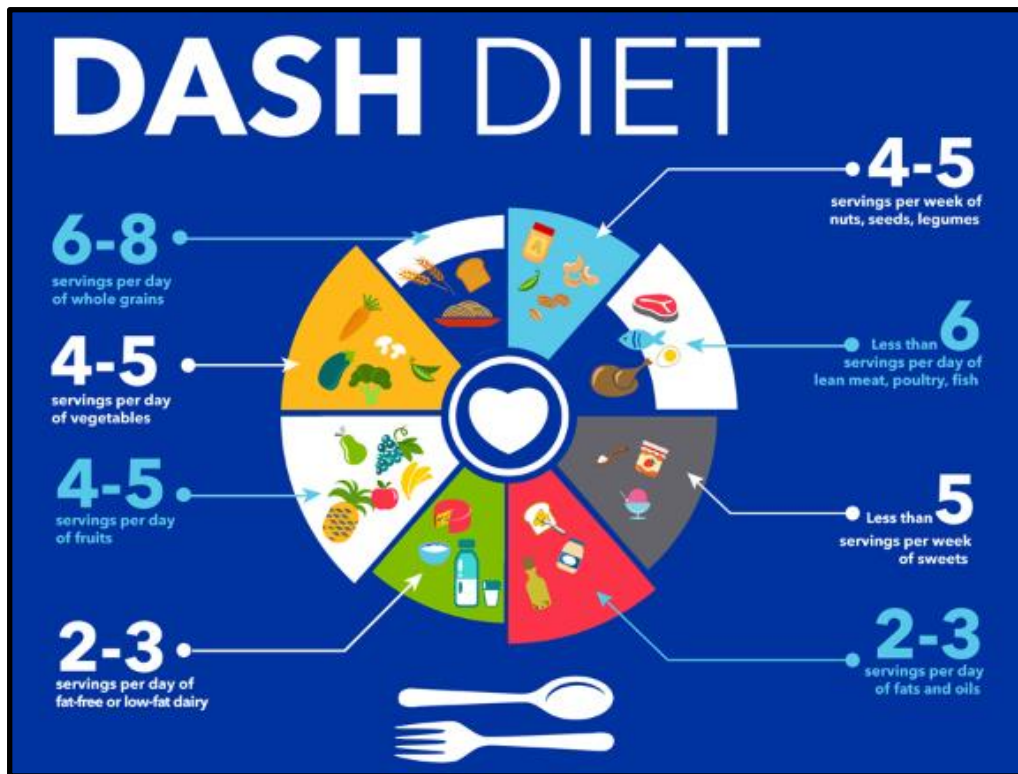
General consensus between nutritionists, dieticians, and some other experts is about saturated fats, which are lower health as compared to unsaturated fats. Moreover, the overall effect of health on saturated fats has remained controversial (Wallis *et al.* 2022). Few crucial researchers have believed this might be developing heart disease risk, whereas others believe such moderate amounts may be beneficial for health. Reducing saturated fat intake may produce a “small but potentially significant” reduction in heart disease risk. As per the view of Vafaeiet *al.* (2020), fat is a necessary nutrient which the human body is required for functioning as fully. Apart from that, fats in most diets have helped the human body for absorbing minerals and vitamins as well as some other crucial roles (Otenget *al.* 2019). These saturated and unsaturated fats are stored in tissues of the human body that are critical for the regulation of body temperature and energy metabolism and storage.

#### 3.4 Aspect of the DASH Diet and Relevant Nutrition Levels for Controlling Hypertension

The DASH diet is very rich in vegetables, whole grains, and fruits. This has included low-fat or fat-free dairy products along with food itineraries like poultry, fish, nuts, and beans. In the opinion of Carson *et al.* (2020), the DASH diet has limited food, which is too high in overall saturated fats like fatty meats as well as full-fat dairy products. This kind of diet has always provided weekly and daily nutritional goals and the number of servings should have mainly depended on everyday calorie requirements. They have recommended servings from every food group for 2000 calories daily DASH Diet.

- Vegetables: around 4 to 5 serving days and the one single serving is one type of medium fruit, canned fruit,  $\frac{1}{2}$  cup of fresh, and  $\frac{1}{2}$  ounces of cheese (Vest *et al.* 2019).
- Grains: it serves 6 to 8 days and one single serving means one single slice of bread,  $\frac{1}{2}$  cup of cooked rice or cereal.
- Oils and fats: Around a serving of 2 to 3 daily and the one single serve is equal to one tablespoon of soft margarine (Shimwell, 2022).

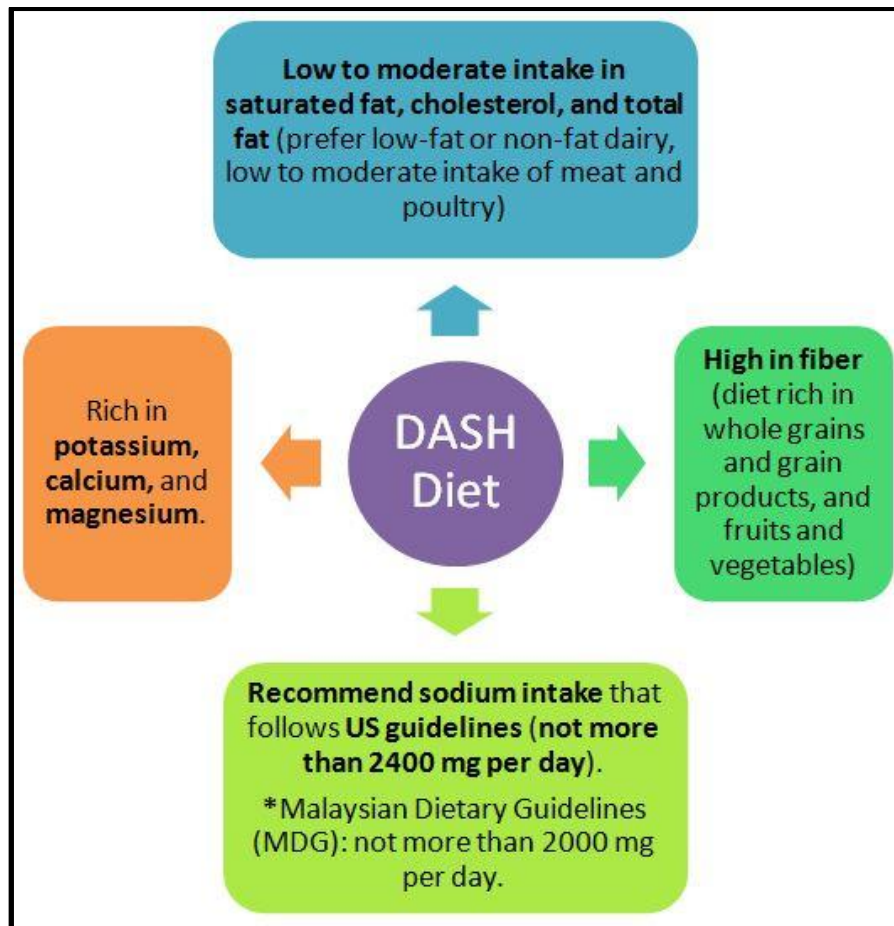
All the foods are the centre of the DASH diet and these are naturally very low in sodium. This diet has lowered the overall high BP, developed a lipid panel as well as assisted people to lose weight and also decreased the type 2 heart diseases and diabetes risk.



**Figure 3.5: Impact of the DASH diet on the human body**

(Source: Influenced by Song *et al.* 2021)

Dietary strategies to prevent hypertension have included decreasing the sodium intake, limiting the overall alcohol consumption, enhancing the potassium intake, as well as adopting an overall dietary pattern like the Mediterranean diet or the DASH diet. In terms of decreasing the overall burden of BO-related complications, the specific efforts, which are focused on individual and environmental behavioural changes that also encourage the choice of healthier food. As per the view of Song *et al.* (2021), hypertension exerts a staggering worldwide burden on the human life quality via contribution to enhancing mortality of cardiovascular disease. Dietary modification has been regarded vastly as a strategy of modification of life with much of the enormous potential to prevent hypertension at a particular cost, which is frequently lower compared to present “pharmacologic interventions” (Sookrahet *al.* 2019). However, some specific and successful interventions are being reflected in the entire directory system that recommended weight loss. As cited by Loucaet *al.* (2022), the DASH diet strategy is a well-known strategy to lower BP and it is the perfect dietary approach for stopping the hypertension pattern. This diet system also reduced the high BP significantly among normotensives.



**Figure 3.6: DASH diet to reduce blood pressure**

(Source: Influenced by Arab *et al.* 2022)

The pattern of DASH has been to emphasise a rich diet in vegetables, fruits, and dairy products that are low-fat. In the opinion of Filippouet *al.* (2020), the DASH diet has combined several nutrients, which have been shown to assist in decreasing high BP. Those particular nutrients include potassium, calcium, fibre, and protein, as well as less saturated fat and total fat. In the opinion of Ramesh *et al.* (2022), this particular diet has recommended menus that contain of 2300 mg sodium. Moreover, following a DASH diet might delay the requirements for taking medicine for high BP and it may keep from requiring you to take this at all. As per the view of Arab *et al.* (2022), the diet for the DASH is very simple such as eating more vegetables, fruits and low-fat foods. It also recommends cutting back on foods that are generally high in saturated fats, Tran's fats, and cholesterol. The DASH diet has been calls for certain serving numbers every day from different food groups.

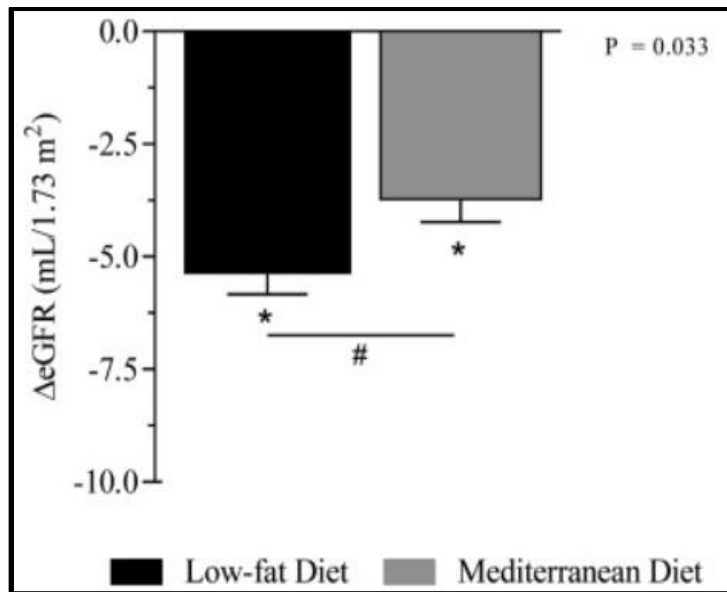
### 3.5 Strategies Regarding Constructive Diet Approaches for Preventing Hypertension

Effective dietary strategies and interventions can allow the prevention of heart diseases and various other secondary cardiovascular diseases. In this context, a vegan diet is highly

preferred and suggested for individuals for controlling heart diseases and hypertension. The research made by Shah *et al.* (2018) has undertaken a randomised controlled trial on participants with different coronary artery diseases. These participants have been put under 8 weeks of a vegan diet or a diet suggested by the American Heart Association. Additionally, the participants have also been provided with different provisions of groceries, dietary counselling and proper tools to measure overall dietary intake. The results obtained from this study indicate that a vegan diet helps in lowering high-sensitivity C-reactive protein as a risk factor for causing heart disease and hypertension.

Certain studies have identified the benefits of a vegetarian diet in the reduction of cardiovascular risk instances in patients. In particular, the research by Djekic *et al.* (2020) studies the influence of a vegetarian diet in reducing cardiovascular risks among patients suffering from ischemic heart disease. Accordingly, a randomised control was conducted on participants suffering from ischemic heart disease while being put under 4-week intervention periods of an isocaloric vegetarian diet and meat diet. Every participant was provided with individually designed diet plans, separated by a 4-week washout period. According to the results generated, the vegetarian diet, coupled with optimal medical therapy, served to reduce oxidised LDL-C levels. This led to improvements in cardiometabolic risk factors among the individuals while altering the relative presence of plasma metabolites and gut microbes among the patients, thereby helping in tackling ischemic heart disease.

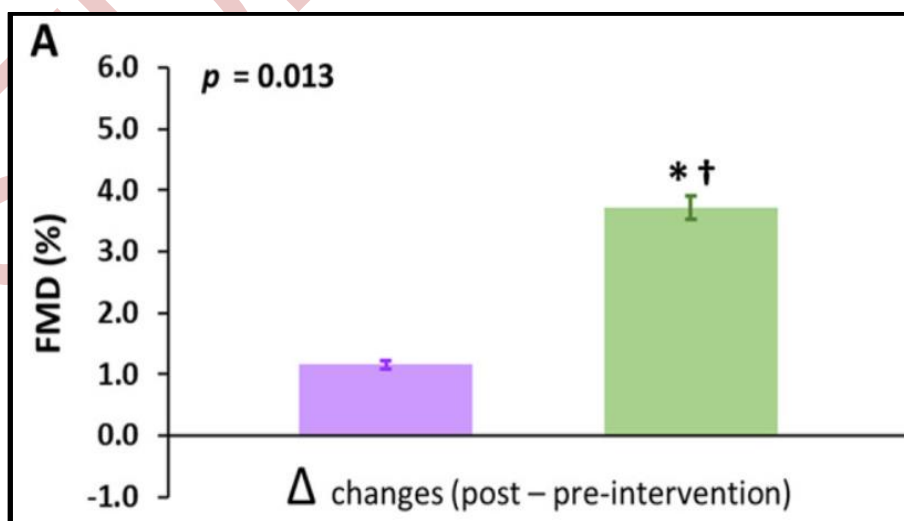
A Mediterranean diet is another main dietary practice that is recommended by health professionals for the prevention of heart disease and hypertension. The Mediterranean diet is considered a prevalent dietary pattern mainly known for various health benefits, including cardiovascular disease prevention. The results obtained from the PREDIMED study have indicated the Mediterranean diet has a higher degree of effectiveness in preventing cardiovascular diseases, as compared to a reduced-fat diet. In this context, the research undertaken by Jimenez-Torres *et al.* (2021) undertook randomised controlled trials on 939 participants, with each participant having IMT-CC evaluation completed at the baseline. Accordingly, these individuals were put on a Mediterranean diet or a low-fat diet. The results indicate that a Mediterranean diet reduced IMT-CC within 5 years while being maintained at 7 years in comparison to the baseline. However, a low-fat diet was unable to change the IMT-CC.



**Figure 3.7: Effect of dietary intervention on eGFR in patients**

(Source: Podadera-Herreros *et al.* 2022)

Cardiovascular diseases among individuals are bi-directionally related to several other health ailments. For instance, studies have proven that chronic kidney disease (CKD) is a major health issue that is significantly associated with cardiovascular heart disease (CVD). CKD is also considered a core independent risk factor that causes cardiovascular health issues and can lead to cardiovascular-related deaths. In this context, Podadera-Herreros *et al.* (2022) conducted research wherein different CHD patients were randomised to follow a Mediterranean diet or a low-fat diet. The estimated glomerular filtration rate (eGFR) declined in the case of both dietary interventions. However, a greater amount of decline was observed among patients taking a Mediterranean diet as compared to individuals having a low-fat diet.



**Figure 3.8: Effect of dietary intervention on endothelial function**

(Source: Yubero-Serrano *et al.* 2020)

Studies have further shown a definite impact placed by the Mediterranean diet on endothelial function in patients suffering from coronary heart diseases. In this regard, the CORonary Diet Intervention with Olive oil and cardiovascular PREVention (CORDIOPREV) are identified as an ongoing randomised controlled trial with the primary objective to compare the effects of two different dietary health patterns based on cardiovascular events. According to Yubero-Serrano *et al.* (2020), around 805 participants, who had completed the endothelial function study at baseline, were put under randomised controlled trials. Accordingly, the participants were put on a Mediterranean diet or a low-fat diet. Similar to the previous studies, the Mediterranean diet has been demonstrated to produce better modulation of endothelial function in comparison to a low-fat diet, thereby preventing cardiovascular diseases and hypertension.

The effect of Mediterranean or a low-fat diet on preventing cardiovascular diseases among individuals can be mainly attributed to the effect of such diets on Blood Fatty Acids. Studies have shown that a Mediterranean diet is useful in preventing cardiovascular diseases through various putative mechanisms, mainly including modifications made within the blood fatty acid (BFA) profile. In this context, the research study by Giroliet *al.* (2021) undertook a randomised controlled trial on 120 patients having a recent history of coronary heart disease (CHD), while being put on a Mediterranean diet or a low-fat diet. The results have shown both diets were highly effective in reducing saturated fatty acids. However, putative favourable changes were observed to be significantly larger in the case of the Mediterranean diet, as compared to the low-fat diet. Therefore, the Mediterranean diet has been determined to be more effective in preventing CHD on omega-3 levels.

### **3.6 Summary**

This chapter has provided a systematic literature review while following the search strategy mentioned in the methodology section. Accordingly, a set number of journal articles were used concerning each theme, based on respective research objectives. In this regard, the concept of saturated and unsaturated fats and the contribution of such elements towards causing hypertension have been elaborated in the literature review. Additionally, the suggested level of saturated and unsaturated Trans fats have also been studied. Key findings from different research studies have been generated based on the aspect of the DASH diet and the influence of relevant nutrient levels for controlling hypertension among individuals. Furthermore, recommended dietary strategies for preventing heart diseases and hypertension among individuals have also been studied.

## **Chapter 4: Discussion**

### **4.1 Introduction**

In this chapter, the key findings have been discussed that have been obtained from the different research articles considered for the systematic review in the previous section. Accordingly, every finding across respective themes has been discussed concerning the research objectives. In addition, every finding has been justified using further readings from related research studies. The findings have also been compared to various other external sources to provide a robust conclusion to key research objectives.

### **4.2 Discussion of the Findings**

In terms of factors causing cardiovascular disease among individuals, the research studies have provided various key insights. For instance, it has been determined that consuming food with high trans-fats is one of the major causes of fat building within the human body. Accordingly, the consumption of food with high trans-fat content leads to a build-up of fat within the arteries and other blood vessels within the body. This in turn leads to an increase in blood pressure, thereby being the lead cause of various cardiovascular diseases and hypertension. As per the study by Mir *et al.* (2021), saturated fats, also termed trans-fat, are the lead cause of the deposition of fatty elements within different blood vessels in the body, thereby causing a condition termed as hardening of arteries. This deposition is mainly caused by unsaturated fats becoming liquid at room temperature and hence, becoming more likely to clog within the blood vessels.

Unlike Trans fats, healthy fats have been determined to be beneficial for the human body. According to Yubero-Serrano *et al.* (2019), healthy fats are identified to be necessary components of an individual's diet for ensuring proper control of inflammation is maintained within the cells. In this context, this has been deemed possible through the consumption of food having large amounts of healthy and unsaturated fats. Furthermore, the study by Di Palo and Barone (2020) has also stated that unsaturated fats help in maintaining a healthy body by ensuring a proper cholesterol level is maintained, mainly facilitated through the elimination of bad cholesterol. Accordingly, it has been determined that maintaining a low level of cholesterol would enable different heart diseases to be effectively prevented.

In terms of the second objective, different research studies have been reviewed to gather findings based on the suggested levels of saturated and unsaturated fats that are necessary for controlling hypertension and related cardiovascular diseases among individuals. In this

context, the findings from the research study by Liu *et al.* (2017) suggest an overall fat intake of around 20% to 35% of the entire calories, referring to the Dietary Guidelines of WHO. Additionally, it has been determined that unsaturated fats, which hold a liquid form at room temperature, provide a wide range of health benefits including stabilisation of heart rhythms and controlling cholesterol levels (Bartaet *al.* 2021). Furthermore, it has been found that unsaturated fat consumption is not readily observed among most individuals. On the contrary, dietary guidelines from different sources recommend less than 10% saturated fats daily. In this regard, the consumption of low-fat dairy products has been associated with the mitigation of high systolic blood pressure.

Instances of the Mediterranean diet preventing key factors of cardiovascular disease among individuals have been studied. Findings have suggested that a Mediterranean diet comprises high energy proportions from the “unsaturated fatty acids”, with such being mainly derived from olive oils. In addition, the study by Curcioet *al.* (2020) has stated that “polyunsaturated fatty acids” are included within omega-3 and omega-6 level fats. In this regard, it has been determined that all these fatty acids are essential for brain development. Furthermore, consumption of “monounsaturated fatty acids” has been positively linked with adequate blood pressure level control. Controlling high blood pressure is deemed necessary for preventing various cardiovascular diseases and hypertension (Rahimiet *al.* 2021). In this context, the research studies state the recommendation from doctors regarding an intake of less than 6 g per day.

In conjunction, the consumption of low-fat foods has also been recommended, including fibre-based foods and various kinds of fruits and vegetables. Fibre-based foods have been identified to be effective in controlling blood pressure (CigarránGuldriset *al.* 2022). Similar health benefits are provided by regular intake of fruits and vegetables as well. In this context, further research studies have been reviewed based on the DASH diet. According to the studies, the DASH diet is defined as a diet very rich in vegetables, whole grains and fruits (Mohseniet *al.* 2020). In addition, a DASH diet comprises food items that have high protein and low-fat content with examples including poultry, fish and nuts. Studies have also shown that this specific kind of diet has allowed individuals to effectively meet core nutritional goals, wherein the number of servings is essentially dependent on every calorie requirement. Further studies have shown that a DASH-based diet is highly effective in controlling cardiovascular disease and hypertension among individuals (Bardagjy and Steinberg, 2019). Therefore, the DASH diet is highly recommended for individuals currently suffering from or having a history of coronary heart disease.

The fourth objective is based on identifying effective dietary interventions that are effective in preventing various forms of heart disease and hypertension among individuals. In this context, the Mediterranean diet has been highly recommended across a wide range of studies. For instance, the study by Podadera-Herreros *et al.* (2022) shows through randomised controlled trials that the Mediterranean diet is comparatively more effective than a low-fat diet in controlling eGFR levels in patients. Additionally, other studies have also found the effectiveness of the Mediterranean diet in preventing heart disease by controlling various risk factors, including ischemic heart conditions and chronic kidney diseases. Besides a Mediterranean diet, a vegan diet has also been deemed highly effective in controlling heart diseases and hypertension

### **4.3 Summary**

The key findings generated from the systematic literature review have been discussed in this section. Every finding has been related to respective objectives while ensuring the objective has been properly achieved. In addition, the key findings generated have been compared with various other external literature sources. Deriving from different research findings, an overview of the main concepts based on saturated and unsaturated fats has been presented. Following this, external sources have been used to provide further related insights regarding various dietary interventions that are effective in mitigating cardiovascular diseases among individuals. In this context, information has been mainly derived with respect to DASH and Mediterranean diet patterns.

## Chapter 5: Conclusion

### 5.1 Conclusion

In the 21st-century, hypertension has affected humans globally in large numbers and has been a common health disease evidence. In simpler terms, research concludes with the basic idea of hypertension where pressure increases in blood vessels of humans causing adverse impact on functioning of different organs and cardiac muscles. This study has emphasised on the opinion of WHO where it is evident that the majority of cardiac failure or heart diseases are grounded with hypertension globally. In countries like Europe, an average rate of 22 people out of every 100 individuals are suffering from hypertension with sudden spikes affecting brain, kidney and other organs. The study has a systematic literature review following different secondary academic journals that emphasises interventions of overcoming hypertension among people through their regular food habits and lifestyle. With help of the PICO framework and intervention involving dash diets have been evident to control hypertension. Sources like PubMed or MEDLINE and CINAHL have been used in this study to gather relevant information on different medical interventions for controlling hypertension. A dash diet involves a high amount of vegetables, whole grains and fruits that helps in controlling hypertension. This diet involves low-fat or fat-free dairy products along with poultry, fish, nuts and beans. This diet mainly aims to reduce fat levels in food products consumed by humans thereby avoiding fatty meat and other dairy products like cheese and butter. A dash diet helps in controlling fat consumption along with other organ functioning and metabolism rate of the human body thereby allowing optimum absorption of minerals and protein. Similar to this context, it has been evident in study that unnecessary consumption of saturated and unsaturated fat leads to extra storage of fats in tissues nearby affecting regulation of body temperature and weight. Resulting to hypertension, improper food add also brings a high chance of cardiac diseases along with cholesterol and unnecessary weight gain affecting bones. Moreover, this study also comes up with different strategies of making people feel aware of dash diets thereby helping them to have a healthy lifestyle without medication. Dash diet emphasises on providing people relief from hypertension along with awareness of healthy food habits. The study concludes with the importance of the dash diet and its impact on the human body in preventing hypertension which simultaneously also involves a reduction in alcohol consumption, sodium intake, potassium consumption and low-fat food habits. Different healthcare organisations are putting an effort on promoting

dash diets among people so as to motivate them to find back hypertension permanently for a better well-being.

## **5.2 Objective Linking**

*Objective 1: To examine the effect of Trans fat in creating heart diseases such as hypertension.*

This objective has been identified in chapter 3 where concepts of saturated and unsaturated fats have been identified. In section, impact of consuming high amounts of trans-fats have also been identified in study resulting in fatty deposits in blood vessels causing hypertension.

*Objective 2: To evaluate the level of saturated and unsaturated fat in a diet for controlling hypertension.*

This objective has been well established in chapter 3 especially in sections where different levels of saturated and unsaturated fats have been suggested for controlling hypertension. It has been evident that in order to maintain a healthy lifestyle, less than 10% of calories every day from saturated fat can be consumed.

*Objective 3: To understand proper nutrients of a dash diet that can control hypertension.*

This objective emphasising on nutrients of dash diet has been well highlighted in chapter 3 where vegetables, greens and fat-free food have been suggested. Further, according to the dash diet, this section of study recommends selection of food groups that solve 2000 cal daily for the human body.

*Objective 4: To recommend upon possible solutions on improving diet to prevent hypertension.*

This objective has been identified in the last section of chapter 3 that suggests constructive dietary approaches in preventing hypertension. Considering hypertension as a disease, selection of Mediterranean diet and vegetarian diet has been ideal. Low-fat diet can also be an approach in controlling hypertension and cardiovascular disease.

## **5.3 Recommendation**

Based on this research, it has been evident that people suffering from hypertension is highly common in different countries and therefore the tendency of putting a regular check on blood pressure is much less. Hypertension is considered to be a common disease and therefore the urge of overcoming it among people has been much lower compared to other diseases. People in both rural and urban areas need to have a more prominent idea about hypertension and the impact it can cause on the human body. Along with it, awareness among hypertension can

also initiate the urge of engaging people into a healthy lifestyle thereby affecting adoption of dash diet. Additionally, it can be stated that along with food lifestyle, doctors and international healthcare institutions also need to emphasise on regular exercises and physical activities of humans so as to engage them with burning of calories. With high physical activity, blood circulation and human metabolism gets in control thereby reflecting density of hypertension. Additionally, it has been evident in recent times that people have been much aware of the consequences of hypertension. However, these people are not much proactive in engaging themselves in regular medical check-ups. Doctors and healthcare professionals also need to arrange different awareness programs and campaigns among people in order to ensure regular medical check-up for tracking blood pressure, organ functioning and body temperature. These recommended initiatives and strategies can only be amended when governments of different countries come together to put forward high financial investments in cardiovascular disease and controlling hypertension among people. At the same time, the government also needs to initiate free medical check-ups for people along with free nutrition counselling sessions so that they can understand the importance of the dash diet and get accustomed to it.

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#### **Chapter 4: Discussion**

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