UNIVERSITI PUTRA MALAYSIA

OBSERVATIONAL STUDY OF ELDERLY PATIENT CHARACTERISTICS AT DIETETICS CLINIC, HOSPITAL PENGAJAR UPM (HPUPM)

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BY

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A project submitted as partial fulfilment of the requirements for the degree of Bachelor of Science in Dietetics with Honours at the Faculty of Medicine and Health Science, Universiti Putra Malaysia.

This project entitled " Observational Study Of Elderly Patient Characteristics At Dietetics Clinic, Hospital Pengajar Upm (HPUPM)" was prepared by Nur Aqila binti Yusri and submitted to the Faculty of Medicine and Health Science as a part of fulfilment of the requirement for the degree of Bachelor of Science in Dietetics with Honours at the Faculty of Medicine and Health Science, Universiti Putra Malaysia.

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ABSTRACT

OBSERVATIONAL STUDY OF ELDERLY PATIENT CHARACTERISTICS AT DIETETICS CLINIC, HOSPITAL PENGAJAR UPM (HPUPM)

NUR AQILA BINTI YUSRI

Non Communicable Diseases NCD are highly prone to the elderly and dietary intake are one of the factors for this to happen. This study aimed to determine the characteristics of elderly patients at dietetic clinic, Hospital Universiti Putra Malaysia. Based on the criteria, 165 of elderly patient had fulfilled the requirement and included in the sample. Sociodemographic, health condition, biochemical parameters, dietary intake as well as the nutrition intervention prescribed to the patient were recorded. Recording form was created to be extracted from the dietetic care notes by the dietitian and also from the online database of the patient. By using SPSS-24, Chi-square and t-test has been used to determine the differences of health condition and biochemical parameters between gender and age group of the elderly patient at HPUPM. After analyse, the majority of the elderly at dietetic clinic HPUPM are Malay (88.5%) and in the age category of 60 to 74 years old (89.1%) with the mean age of 66 years old. 57.7% of them are categorise as Health Weight with BMI 24 to 30 kg/m2 with the mean of 28kg/m2. Among the elderly patient, most of them have hyperlipidemia (78.2%) while the most uncontrolled biochemical parameters between them is HbA1c and LDL level with 62% and 60% respectively. Based on the dietary intake, the mean energy intake of the elderlies are 1475kcal per day with 52% of carbohydrate, 14% of protein and 35% of fat from their daily intake. The highest nutrition intervention prescribed are fat modification (51%) and followed by 49% are carbohydrate modification. Lastly, there are significant difference between HbA1c, TC and HDL-c level and gender of the elderly with ($p = 0.029$) for HbA1c, ($p = 0.043$) for TC and ($p = 0.001$) for HDL-c level.

ABSTRAK

KAJIAN PEMERHATIAN MENGENAI CIRI-CIRI PESAKIT WARGA EMAS DI KLINIK DIETETIK HOSPITAL PENGAJAR UPM (HPUPM)

NUR AQILA BINTI YUSRI

Warga emas terdedah kepada risiko Penyakit Tidak Berjangkit (NCD) dan faktor seperti pengambilan makanan adalah salah satu faktor perkara ini berlaku. Kajian ini bertujuan untuk mengetahui ciri-ciri pesakit warga emas di klinik dietetik, Hospital Universiti Putra Malaysia. Berdasarkan kriteria tersebut, 165 pesakit tua telah memenuhi syarat dan dimasukkan ke dalam sampel. Sosiodemografi, keadaan kesihatan, parameter biokimia, pengambilan diet serta intervensi pemakanan yang ditetapkan kepada pesakit telah direkodkan. Kami mencipta borang rakaman untuk diekstrak daripada nota penjagaan diet oleh pakar diet dan juga daripada pangkalan data dalam talian pesakit. Dengan menggunakan SPSS-24, Chi-square dan ujian-t telah digunakan untuk menentukan perbezaan keadaan kesihatan dan parameter biokimia antara jantina dan kumpulan umur pesakit warga emas di HPUPM. Selepas dianalisis, majoriti warga emas di klinik dietetik HPUPM adalah Melayu (88.5%) dan dalam kategori umur 60 hingga 74 tahun (89.1%) dengan purata umur 66 tahun. 57.7% daripadanya dikategorikan sebagai Berat Kesihatan dengan BMI 24 hingga 30 kg/m2 dengan min 28kg/m2. Dalam kalangan pesakit warga emas, kebanyakan mereka menghidap hiperlipidemia (78.2%) manakala parameter biokimia yang paling tidak terkawal di antara mereka ialah paras HbA1c dan LDL masing-masing 62% dan 60%. Berdasarkan pengambilan pemakanan, purata pengambilan tenaga warga emas ialah 1475kcal sehari dengan 52% karbohidrat, 14% protein dan 35% lemak daripada pengambilan harian mereka. Intervensi pemakanan tertinggi yang ditetapkan adalah pengubahsuaian lemak (51%) dan diikuti oleh 49% adalah pengubahsuaian karbohidrat. Akhir sekali, terdapat perbezaan yang ketara antara tahap HbA1c, TC dan HDL-c dan jantina warga emas dengan ($p = 0.029$) untuk HbA1c, ($p = 0.043$) untuk TC dan ($p = 0.001$) untuk tahap HDL-c.

CHAPTER 1

INTRODUCTION

According to National Health and Morbidity Survey (NHMS 2019), 40% of total outpatient are elderly and 74.1% of people who came were due to related health problem (NHMS, 2019). This counselling session are intended to promote healthy eating, well-being and to help patients with chronic disease to manage their dietary planning. According to World Health Organization (WHO) elder population aged 60 years and above are growing fast and Non-Communicable Disease (NCD) are the biggest challenge health issue. Preparations need to be done to make sure the rate of healthy elders' population are well-maintained while quality of life and life expectancy can be improved. Development of Non-Communicable disease are long and slow progress and the starting point of the disease itself are indefinite, hence risk of NCD increases with age (Liu et al., 2020).

Diabetes, hypertension, obesity and hyperlipidemia are among the most common Non- Communicable Disease (NCD) that has infected people and causes the highest mortality factor around the world. Approximately 41 million people die each year due to NCD factors including developed and also developing countries (WHO, 2021). This

chronic disease takes some time to develop and some of the most common factors are unhealthy eating habits, sedentary lifestyle, genetics and also physiological changes. It usually starts with obesity due to excessive energy intake and finally, it leads to other diseases such as diabetes, hypertension and also hyperlipidemia. Obesity, especially abdominal obesity, has been significantly shown that it can lead to NCDs due to the abundant fat composition compared to the lean body mass in a person's body. Body Mass Index (BMI) and body weight may not show accurate results to the NCDs, but the waist circumference really did. Apart from that, excess abdominal fat has been scientifically proven that it can increase the risk of insulin resistance, hyperinsulinemia and also glucose intolerance which may lead to diabetes (Dhawan & Sharma, 2020).

Hypertension also has been significantly related to obesity which some of the factors are high sodium intake and also sedentary lifestyle. In a study, in which they compared the prevalence of hypertension between 4 groups with 4 different fields of occupation from the most physically active such as fisherman and soldier to the least physically active which is unemployed. Through the study, Group I and II which are both physically active did not show significance to hypertension while Group IV showed significant association to the prevalence of hypertension (Lim et al., 2017). Hyperlipidemia is defined as elevated Low-Density Lipoprotein (LDL-c) which can cause severe impacts such as atherosclerosis, ischemic heart disease and other cardiovascular diseases. Diabetes Mellitus has been showing association to hyperlipidemia because its role is to decrease the catabolism of triglycerides lipoproteins of intestinal and hepatic origin and leads to elevation of cholesterol level (Lertwanichwattana et al., 2021).

In a study of prevalence and factors associated with multimorbidity among older adults in Malaysia, the results have shown that two most highest data for NCD among elderly are hypertension and dyslipidemia which is 51.1% and 41.8% respectively and followed by diabetes and abdominal obesity (Shariff Ghazali et al., 2021). Progress to develop NCD is long and slow, in addition to that, low physical activity level is the 4th leading risk factor for global mortality. Approximately 59% of the total population are 75 years and above are least active and this shows that the risk of NCD is increasing with age (NHMS, 2019). Multimorbidity risk between elderly has shown significantly higher risk of morbidity and mortality which in a study shows that 145 deaths were identified by 2017 among 1,451 elderly patients in a cohort study in Brazil (Lima et al., 2021). The presence of non-communicable disease (NCD) such as diabetes, hypertension, hyperlipidemia and obesity can lead to severe NCD such as heart attacks, coronary artery disease (CAD), ischemic stroke and has significantly proven that it is associated to the morbidity of the elderly and hence, intervention and precautions steps should be taken in order to control the risk of the elderly (Al-Mawali, 2015).

One of the most important ways to reduce mortality due to the Non-Communicable Disease is by controlling the unhealthy factors contributing to a healthier lifestyle. Choose a healthier diet to consume, choose to be physically active and also choose a healthier lifestyle such as eliminating smoking and alcohol. One of the contributing factors for all these diseases to happen is the lack of knowledge among the public and the absence of a well-designed plan to stop disease occurrence and development. Hence, giving education and a well-planned designed intervention to the public can help them to reduce the risk of morbidity and mortality. Referral to a dietitian by the doctors or physicians can be

considered as one of the ways to control the risk of NCDs from getting worse. There is a list of characteristics that will be referred to by the Dietitian according to its disease specification in order to diagnose and give intervention to the patient. Dietary intake such as total energy consumption, amount of fats, carbohydrate and protein intake, body composition and also the health status of the patient is a part of it (Budreviciute et al., 2020).

1.2 Problem Statement

Non-communicable disease NCD has affected approximately 41 million people as well as being the common cause for mortality all over the world (WHO, 2021). World's population is getting bigger day by day and by 2030, it is expected that 52 million deaths caused by the NCD and comprehensive intervention need to be done in order to control and to manage this massive problem. Given the importance of nutrition intervention to control and manage the health condition of the patient, it is important to study the characteristics of the patient with NCD before carrying out the plan on how to manage the problem. Hence, the data collected are the details about the health conditions that are having by the elderly patients at dietetic clinic HPUPM. After analysis, the most frequent health conditions between diabetes mellitus, hypertension and hyperlipidemia are indicated at dietetic clinic HPUPM.

Besides that, biochemical parameters are also included in this study to observe the population of patients that are having controlled and uncontrolled conditions by using HbA1c, systolic and diastolic as well as the lipid profile. With this, it is easier to indicate

which health condition has the most uncontrolled condition and need extra attention to be resolved as well as need more improvements in managing the condition. Apart from that, data for the dietary intake as well as the nutrition intervention was also gathered. From this data, results whether elderly with NCD has sufficient diet intake and other composition of carbohydrates, proteins and fats as well as the common nutrition intervention prescribed by the dietitians can be interpret. There is a lot of study that shows the relationship between dietary intake and biochemical parameters and also many other studies that study prevalence of NCD, but limited studies showing the characteristics of elderly patients. Despite this, its the first study of characteristics of elderly patients at diet clinic HPUPM.

There are limited studies about the current characteristics of non communicable disease not only in Malaysia but also all over the world. There are usually other studies such as NCD Behavioural Risk Factors and Mortality Among Older Adults, Chronic NCD and their Implications in the Life of Dependent of Elderly People (Lima, et al., 2021; Figueredo et al., 2021) but limited study that explains detailed conditions of NCD among patients. With detailed characteristics of the patients, clinical dietitians can improve the current nutrition intervention to the more proactive intervention to manage the health condition.

In a meta-analysis study, the involvement of dietitians in the healthcare team has been significantly proved that it can help to reduce the blood pressure level of a patient where approximately has reduced 3.5 mmHg in SBP and 2.5 mmHg in DBP (Riegel et al., 2017). Educational programs to modify lifestyle with adherence to healthier nutritional recommendations such as sodium restriction and weight loss have significantly shown the

effectiveness of nutritional interventions to manage blood pressure problems. Dietary behaviour prescribed by the dietitian has significantly shown improvement for the lipid profile of a patient where it helps to reduce and manage the cardiovascular disease that is caused by undesirable total cholesterol (TC), LDL level and also TG level (Ross et al., 2019). Blood lipid profiles can be improved by enhancing the amount of daily fibre intake, vegetables and fruits intake, types of fat preference which is the monounsaturated fatty acid and polyunsaturated fatty acid.

Hospital Pengajar Universiti Putra Malaysia (HPUPM) started operating in the year 2020 and is still new in providing healthcare services to the public. Therefore, the purpose of this study is to observe the characteristics of patients at Dietetic Clinic HPUPM. The following research questions are investigated within this research framework.

1. What are the health conditions and its biochemical parameters of the elderly patients at Dietetics Clinic HPUPM?
2. What is the current dietary intake of elderly patients at Dietetic Clinic HPUPM?
3. What is the nutrition intervention for the health condition of elderly patients at Dietetic Clinic HPUPM ?
4. What is the comparison between health condition and its biochemical characteristics between gender and age group of elderly patients at Dietetics Clinic HPUPM?

1.3 Significance of the Study

The purpose of this study is to observe the characteristics of patients at Diet Clinic HPUPM with multiple aspects such as sociodemographic factors, health condition, biochemical parameters, dietary intake and nutrition intervention. There are limited studies that highlight the characteristics of NCD in the community, especially elderly population. As the time changes, the characteristics of the are getting different and also have different characteristics when compared to the other country. Hence, this study is the updated characteristics of elderly with NCD for elderly populations at HPUPM. This study contributes to the data of referral of patients to the dietetic clinic HPUPM.

Apart from that, referral to the dietetic clinic will also help to control and manage the severity of a certain disease from getting worse. In order to do the intervention to the patients, the clinical dietitians need to understand their characteristics well because it is different among the population with their different socioeconomic background as well as their culture. With this study, dietitians can know the common characteristics of the patients at diet clinic HPUPM.

Apart from that, this study also points out the dietary intake of the elderly patient at dietetic clinic HPUPM and can be used as an idea for new research topic. This study will show the characteristics and future research such as the association of dietary intake to the biochemical parameters of the patient can be explored more. Lastly, this study also observes the significant difference of health condition and biochemical parameters between gender and age group.

1.4 Objectives

1.4.1 General Objective

To observe the characteristics and significant differences between health status and biochemical parameters between gender and age group of elderly patients at Dietetics Clinic in Hospital Pengajar Universiti Putra Malaysia (HPUPM).

1.4.2 Specific Objectives

1. To determine the characteristics of demographic factors (age, gender and ethnicity) and health condition (diabetes, hypertension, hyperlipidemia) of the patients.
2. To identify the biochemical parameters (HbA1c, systolic, diastolic, total cholesterol, triglycerides, HDL-c and LDL-c level) of elderly patients.
3. To determine the current dietary intake (Total energy consumption, carbohydrate percentage, protein percentage and fat percentage) of the elderly patients.
4. To identify nutrition intervention prescribed to the elderly patients.
5. To determine the significant differences of health condition and biochemical parameters between gender and age group of elderly patients.

1.5 Research Hypothesis

There are significant differences between health conditions of diabetes, hypertension and hyperlipidemia and biochemical parameters of HbA1c, blood pressure and fasting serum lipid level between gender and age group.

1.6 Conceptual Framework

The conceptual framework on figure 1 shows the characteristics of patients at Dietetic Clinic HPUPM which is the demographic factors, including age, sex, ethnicity, body weight and BMI. Next, health condition of the patient such as diabetes, hypertension and/or hyperlipidemia where it can observe the highest data of referral to the dietetics clinic. Then, the biochemical parameters (HbA1c, systolic, diastolic, total cholesterol, triglycerides, HDL-c and LDL-c). With all the parameters from the data, the mean biochemical parameters for patients that being referred to dietitian can be observed. Besides, dietary intake (total energy, carbohydrate percentage, protein percentage and fat percentage) as well as the nutrition intervention prescribed by dietitians.

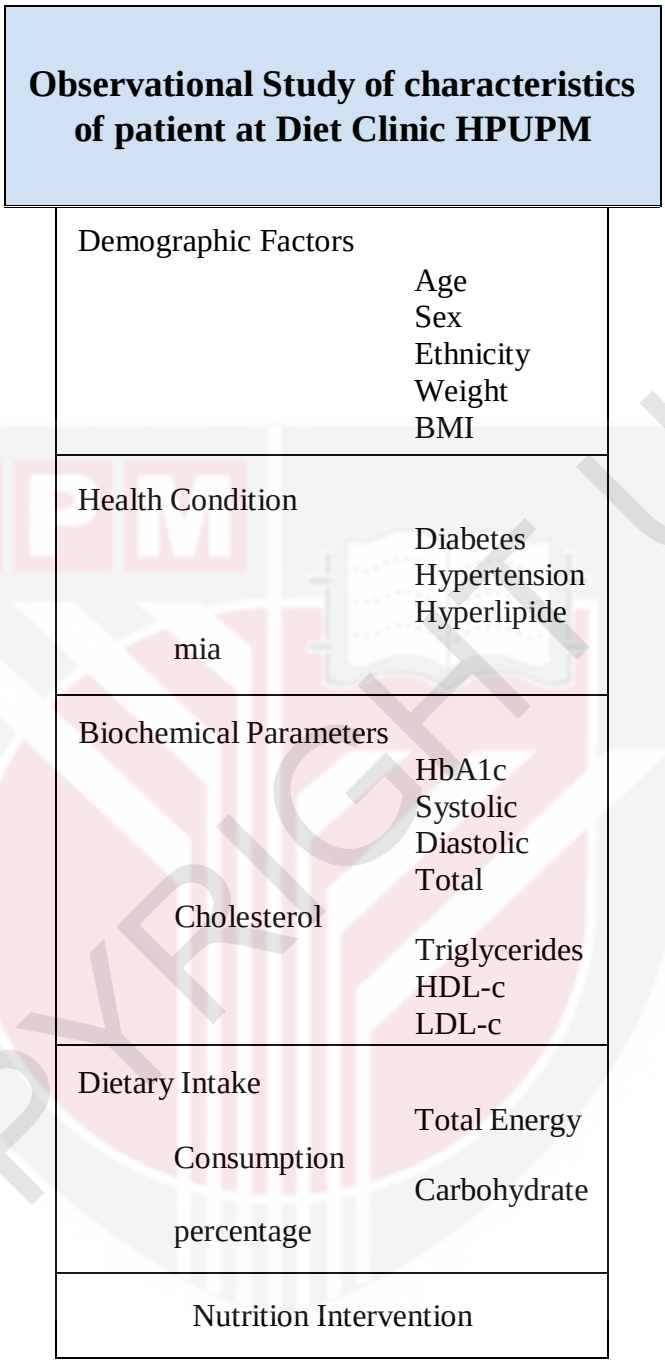

Figure 1.0 Characteristics of Patients at Dietetics Clinic HPUPM

CHAPTER 2

LITERATURE REVIEW

2.1 Elderly population

The World Health Organization (WHO) defines elderly as individuals aged 65 years or older. However, the definition of elderly in Malaysia as stated by the Public Service Delivery and Local Government is those who are 60 years old and above. According to the Department of Statistics Malaysia, the population for elderly more than 60 years old is 3.6 million by 2021 which comprises 11.2% of the total Malaysian population. This data shows the growth of elderly population by 0.5% compared to the year of 2020 and it is expected to keep growing by the year 2050 as predicted with 17% of elderly population. Globally, Europe has the oldest population in the world and the total population of 60 years and older globally is around 1.06 billion and will be expected to double up with around 2.1 billion elderlies by the year of 2050 (Ang, 2021).

2.2 Non-Communicable Diseases (NCD) in elderly population and its consequences

The population of older people aged more than 60 years old is getting higher which in 2030 the expected population is around 14% of the total Malaysian population. As the population gets bigger, the burden of illness of non-communicable disease (NCD) for older people is also getting higher where the main risk factors are unhealthy diet, lack of daily physical activity, excessive smoking and also excessive alcohol consumption (Chan et al., 2018). Physically inactive has been one of the most contributing factors to the existence of NCD among the elderly where had caused 80% of cardiovascular disease (CVD), 27% of diabetes, and 3.2 million morbidities globally however, poor health statuses such as knee or back problems, and other physical limitations are the common barriers for the older adults to do the physical activity (Teh et al., 2012). One study of prevalence of NCD among elderly patients shows that 47.8% of the subjects are having hypertension and 26.1% are having diabetes mellitus (Sugathan, 2019). Risk of developing multimorbidity among the elderly are also were investigate in a study which shows that prevalence of multimorbidity in the community are 15.8% and 83.0% (Shariff Ghazali et al., 2021). An approximate 70% of death among elderly with the age of 60 years and above were related to non-communicable disease (NCD) with the presence of behavioural risk factor (BRF) and these factors will lower the life expectancy of a person with the presence of non-communicable disease (NCD) and finally can lead to death (Lima et al., 2021).The presence of non-communicable disease (NCD) has significantly proven that it is associated to the morbidity of the elderly and hence, intervention and precautions steps should be taken in order to control the risk of the elderly. Other than that, it can also develop health condition such as The health education program can help the elderly to

improve their behaviour in order to have a healthier lifestyle, healthier food preferences such as increasing their intakes of vegetables and fruits, healthier methods of preparing their meals and also in order to help the elderly to have a better and controllable NCD status (Iranagh et al., 2017). Other than that, limiting alcohol intake and stopping smoking also has been proved to prevent and control the risk of morbidity of NCD.

2.3 Type 2 Diabetes Mellitus

A total of 90% of diabetes patients worldwide are individual who has been diagnosed with type 2 diabetes mellitus and the prevalence rate of this disease are increasing with age which proves that the elderly is the majority of the total population with existing comorbidities such as obesity and hypertension (Siopis et al., 2019). Apart from that, high body mass index (BMI) and the prevalence of abdominal obesity which is determined by the measurement of waist circumference has also significantly proven the relation to diabetes occurrence by 55.6% and 57.4% where comprises Asian Indians (65.5% - 68.8%), Malays (55.1% - 60.6%), Chinese (49.5% - 51.1%) and Indigenous people (44.9% - 48.3%) (Hussein et al., 2015). Poor control of diabetes is usually due to uncontrolled dietary intakes with high intakes of sugary drinks and high carbohydrates content foods such as bread and rice and also another factor is low physical activity level which for the elderly may be due to physical limitations of back pain, knee pain and fatigue (Abougalambou et al., 2017). Uncontrolled diabetics especially in the Asian population have a high prevalence of combined microvascular complications such as retinopathy, neuropathy, nephropathy and also the main causes of chronic kidney disease(CKD) and End-Stage Renal Disease (ESRD) (Balasubramaniam et al., 2019). Consultation from dietitians and intervention individually created for the patients has significantly proven to

improve the HbA1c level and weight changes of the patients with average 4 times of consultations in a year. Progress of the patients with existing health problems, current dietary intake, and enlightened the knowledge of the patient to control diabetes and to prevent any undesired complications related to Diabetes Mellitus are essential (Zeman et al, 2021; Siopis et al., 2019).

2.4 Hypertension

Hypertension has become a common health issue and is one of the public health concerns globally due to the detrimental consequences it can provide such as cardiovascular diseases and chronic kidney disease (Mills et al., 2016). In the context of Malaysia, a systematic review revealed that the prevalence of hypertension among Malaysian older adults is 42.8% (Chow et al., 2019). Definition of hypertension as stated in the Clinical Practice Guidelines for Management of Hypertension (MSH, 2018) is a persistent elevation in systolic blood pressure of 140mmHg or greater and/or diastolic blood pressure 90mmHg or greater which are measured twice or more, on two different occasions. As ageing is one of the factors contributing to the development of high blood pressure, it is not an uncommon problem that can be observed among the elderly population. The Framingham Heart Study revealed that there is a constant increase in systolic blood pressure (SBP) through the ages of 30 to 84 years old and above. Meanwhile, the trend in diastolic blood pressure (DBP) is different from SBP as it increases until the age of 50 and slowly declines to start from 60 years old onwards (Pinto, 2007). Another known risk factor of hypertension is having a Body Mass Index of the obesity category. Feng and colleagues (2012) suggested that BMI is an acceptable marker for high blood pressure because it reflects the overall body weight without the distinction between adipose tissue

and muscle mass. Researchers have explored the types of intervention that are suitable for persons with hypertension and among the most common one is anti-hypertensive medication. Although anti-hypertensive medicine has proven to be effective, the most appropriate form of therapy for hypertensive elderlies is still in discussion (Buonacera et al., 2018). There are challenges in managing hypertension among older adults due to the specific physiological and functional changes such as neurohormonal and autonomic dysregulation as well as hemodynamic mechanical changes that result in high blood pressure (Oliveros et al., 2019). These in turn, causing controversies in providing treatments and unclear guidelines, especially in terms of the optimal range of blood pressure for elderlies.

2.5 Hyperlipidemia

Hyperlipidemia is defined as excessive amount of fats or lipids in the blood which include cholesterols and triglycerides due to abnormal fat metabolism and it is caused by obesity, family history of high cholesterol level, unhealthy dietary pattern, excessive alcohol consumption, smoking and having hyperlipidemia will double the risk of cardiovascular disease (CVD) prevalence (Yao et al., 2020). According to CPG Malaysian Guideline the cut off point for lipid profiles are Total Cholesterol (TC) should be <5.2 mml/L, Triglycerides (TG) <1.7mm0l/L, HDL-c of >1.0 mmol/L and <2.6 mmol/L of LDL-c with 10 years existing CVD risk (5th edition CPG of Management of Dyslipidemia, 2017). Excessive lipids in the blood will form plaques in the blood capillary (atherosclerosis) and caused disturbance to the bloods to flow all over the organs and entire body that will increase the prevalence of cardiovascular disease (CVD) such as

ischemic heart disease (IHD), ischemic stroke and coronary heart disease (CHD) (Lertwanichwattana et al., 2021). In order to control and to prevent the severity of hyperlipidemia, drugs such as statin are widely used to lower the lipid profile of a patient and also proven to improve cardiac function, inhibit vascular inflammation and also improve left ventricle functions of a heart (Yao, 2020). Other than that, dietetics consultations from a registered dietitian (RD) has also shown significant improvement of a patient's lipid profile where in 10 different studies has shown reductions in TC, LDL and TG of 3 to 12 months post consultation (Ross et al., 2019).

2.6 Obesity

Obesity is defined as having a Body Mass Index (BMI) of 30 kg/m² or more (WHO, 2021). However, there is no exact classification of BMI for elderly populations as there is increasing evidence that argue the WHO BMI cut-off is unfitting for those aged 65 years old and above (NEMO, 2019). According to the National Health and Morbidity Surveys 2019 (NHMS), the prevalence of obesity, or individuals with BMI ≥30 kg/m² among those aged 60 years and older in Malaysia is 17.4%. As previously stated, persons with obesity often have a higher risk of developing NCDs, and this includes elderlies. Therefore, quality of life and functional status would also be significantly affected by having excessive body fat because they are more likely to require hospitalisation as well as develop mobility limitations (Malenfant & Batsis, 2019). Other known implication of obesity is muscle loss and sarcopenia due to the catabolism from the production of pro-inflammatory cytokines which is a result of central body fat redistribution (Mckee &

Morley, 2021). Managing obesity among elderlies has become a challenge because there are concerns raised on older adults losing weight. This is because weight loss can lead to undesirable or even harmful implications, insufficient nutrient intake as well as loss of lean body mass among them (Porter Starr et al., 2016). The contradiction invites a phenomenon called "Obesity Paradox" in which elderly with a higher BMI would obtain some protective effects such as energy reserve and malnutrition prevention though they would have a risk of developing metabolic syndrome (Mckee & Morley, 2021). Nonetheless, studies are conducted to explore the appropriate interventions to cater geriatric obesity. Bales & Porter Starr (2018) reported that interventions that include both exercise regimen and weight reduction diet can be beneficial to elderlies particularly to their physical function. Therefore, treatments provided by dietitians or clinicians shall be studied more to understand the most prevalent form of interventions received by obese elderly patients along with its impact.

2.7 Role of Nutrition Interventions/ Counselling in Controlling NCDs

Nutrition interventions has been implemented widely especially through dietary counselling session of a clinical dietitian with patients to improve their nutrition problem by their dietary intakes and also to improve their status of clinical conditions. According to Global Burden of Disease Study (GBD) of 2013 state that there are 5 leading factors for dietary contributors' death which is low fruits intake, high sodium intake, low nuts and seeds intake, low vegetables intake and also low whole grain intake and these factors are associated with increased chronic disease risk (Afshin et al., 2017). There are 4 domains that can be used in deciding the nutrition intervention for every patient, the first one is

food or nutrient delivery. Dietitians will make an individualised dietary plan for the patient through specific diagnosis and assessment that had been done at the earlier stage. Second domain is by giving nutrition education to the patient. Patient usually have lack of knowledge with what they need to consume and what food they cannot or need to control of their intake for a specific clinical condition. For example, for diabetes patients, some may not have knowledge that they need to control their sugary drinks and carbohydrate intake because these food choices can cause surge in their blood sugar level. Hence, with nutrition education, patient or client will have the basic knowledge on how to control and overcome their current health status from getting worse. Obese patient have limiited knowledge how to control their intake, by referring to dietitian, they know how much specific energy that they need to consume in a day. The next domain will be nutrition counselling where dietitians will help them to adopt a healthy eating lifestyle with better food choices based on their food preferences. In this context, dietitians really need help from the patient itself to change their behaviour to have a better health quality such as to eat more vegetables to reduce their cholesterol level due to hyperlipidemia that they have been diagnosed with. The last domain will be coordination of nutrition care which means that the patient might be probably being referred to other health care providers to assist in managing nutrition related problems such as heart problems.

CHAPTER 3

METHODOLOGY

3.1 Study Design

A retrospective study that observed the characteristics of patients at Dietetics Clinic, all the data was extracted from the available Dietetic Care Notes and database medical records at Hospital Pengajar Universiti Putra Malaysia (HPUPM).

3.2 Study Location

The study was conducted at Hospital Pengajar Universiti Putra Malaysia (HPUPM) which is located at Serdang, Selangor, approximately 30 km south of the capital city of Kuala Lumpur. HPUPM equipped with 400 beds and consist of seven key areas of expertise of stroke care, sports injuries and arthroscopic surgery, men's health, zoonotic, geriatric care, skin disease and immunology and cancer. There are several department in HPUPM, Department of Surgery, Department of Medical Specialist, Department of Medical Microbiology, Department of Radiology, Department of Obstetrics and Gynaecology, Department of Orthopedics, Department of Dietetics, Hospital Nursing Unit, Department of Pharmacy, Department of Psychiatry, Department Paediatrics,

Department of Family Medicine, Department of Ophthalmology, Department of Pathology, CSSC Unit, General Administration Office, Department of Rehabilitation Medicine, RESQ Stroke Emergency Unit, Department of Anaesthesiology and Intensive Care, Department of Otorhinolaryngology, Head and Neck Surgery (ENT), Department of Urology, Clinical Research Unit (CRU), Department of Nuclear Imaging, Counselling and Medical Social Service Unit, Public Health Unit, Department of Neurology and Medical Physics Unit. Department of Dietetics is one of the departments at Hospital Pengajar Universiti Putra Malaysia HPUPM, a teaching hospital that apply 'Blue Ocean' concept where it consists of dietitians and also dietetic lecturers. Services that are provided by this departments are in-patient food services, food provision for health care workers, clinical dietetic services for patients in ward, dietary consultation for outpatient, education and research and also dietetics in the community. In ward patients are usually patients that has been referred by the doctors while outpatients, they need counselling for medical nutrition therapy for chronic disease such as heart disease, diabetes, hypertension and chronic kidney failure.

3.3 Sample Size Determination

Study population are including all the patients who were present in the database during the entire period from the start of the HPUPM operation in January 2019 until the current year of May 2022. All patients aged 60 years and older with at least any one of the existing health status which is diabetes, hypertension and hyperlipidemia were included. Sample size determination was determined by using formula by Lwanga and Lemeshow (1991) :

$$n = \frac{Z^2 P (1 - P)}{d^2}$$

Table 1 : Sample Size Determination

Prevalence Studies	Prevalence Rate, P	Sample Size, n
Reported Prevalence and Risk Factors of Chronic NonCommunicable Disease Among Inmates of Old-Age Homes in Ipoh, Malaysia. (Sugathan et al, 2014)	60%	92
Prevalence and Control of Hypertension Among a Community of Elderly Population in Changning District of Shanghai : A CrossSectional Study. (Yang et al., 2017)	Hypertension 59.9%	92
Prevalence and Factors Associated with Multimorbidity Among Older Adults in Malaysia : A Population-Based CrossSectional Study (Ghazali et al, 2021)	Hypertension 51.1%	**96**
	Dyslipidemia 41.8%	92

3.4 Study Participants

Participants of this study included patients aged 60 years and older with at least one existing health condition which is diabetes, hypertension and/or hyperlipidemia. Selection participants are all available participants who fulfil the characteristics of the inclusion criteria and exclusion criteria stated in the Table 1 below.

Table 2 Inclusion and Exclusion criteria

Inclusion Criteria	Exclusion Criteria
60 years and older	59 years old and below
Patients who referred to Diet Clinic HPUPM	Having health condition of other than diabetes, hypertension, hyperlipidemia and obesity
Having any one of health condition; diabetes, hypertension, hyperlipidemia and obesity.	

3.5 Study Instruments

This study will be using all the available data of patients at Diet Clinic HPUPM including Dietetic Care Notes and online database.

3.6 Procedures

After ethical approval obtained from the Ethics Committee for Research Involving Human Subjects in Universiti Putra Malaysia (JKEUPM), the data collection was

conducted at Hospital Pengajar Universiti Putra Malaysia (HPUPM) from Jan 2022 to May 2022 and was recorded form the dietetics care notes and from the online database.

3.7 Statistical Analysis

For data analysis, Statistical Package for the Social Science (SPSS) version-26 software were use. Data that will be extracted from SPSS where all the data will be divided into two category which is numerical and categorical data. Numerical data such as age, HbA1c, systolic and diastolic, Lipid Profile (Total Cholesterol, Triglycerides, HDL-c and LDL-c) and dietary intake will be extracted by using mean and standard deviation. While categorical data which covers variable BMI, sex, ethnicity, health condition and nutrition intervention will be using frequency and percentage. Bivariate analysis are also included in this study to identify the significant differences between health condition and biochemical parameters between gender and age group of elderly patient at Dietetics Clinic HPUPM and chi-square and t-test were used in this study.

CHAPTER 4

RESULTS AND DISCUSSIONS

4.1 Sociodemographic Characteristics

Table 3 shows the sociodemographic characteristics of eldelry patients at dietetics clinic at Hospital Universiti Putra Malaysia. Majority of the patients are within the age of 60 to 74 years old where it is indicated 89.1% of the total sample while the other 10.9% are elderly aged 75 years old and above. The mean age of the total patient is 66 $\pm$ 5.338 years old. The proportions of gender for the patients are almost the same but male are slightly higher with 52.7%. Malays made up the majority of the whole population with 88.5%, followed by Chinese and Indian with 6.7% and 4.8% respectively. The mean body weight of these sample are 66 $\pm$ 5.338 kg and when it is categorised into Body Mass Index (BMI), 52.1% are considered as healthy weight which within normal range for elderly and followed by 28.5% are overweight and 9.7% are underweight.

Table 3 Sociodemographic Characteristics

Characteristics	N (%)	Mean ± SD
Age		66 ± 5.338
60-74 years	147 (89.1)	
≥ 75 years	18 (10.9)	
Gender		
Male	87 (52.7)	
Female	78 (47.3)	
Ethnicity		
Malay	146 (88.5)	
Chinese	11 (6.7)	
Indian	8 (4.8)	
Body Weight (kg)		66 ± 5.338
BMI		28 ± 4.2767
Underweight (<23kg//m^2)	16 (9.7)	
Healthy Weight (24-30 kg//m^2)	86 (52.1)	
Overweight (>30 kg//m^2)	47 (28.5)	

4.2 Health Conditions and Biochemical Characteristics

After analysing the data, it was found that hyperlipidemia has the highest number of patients with 78.2%, followed by 73.3% of hypertension and 63.6% of diabetes patients. A study shows that individuals that have been diagnosed with diabetes have significantly higher levels of triglycerides which shows that it supports this data (Zhang, et al., 2019). For the HbA1c level of diabetes, the mean reading for the elderly patients are 7.4 $\pm$ 1.7486 mmol/L which is considered an uncontrolled level. From the data, it was found that 62% of diabetes patients have uncontrolled diabetes with a reading of more than 6.5 mmol/L of HbA1c. While for systolic and diastolic level, majority of the patient has controlled blood pressure level with 65% has controlled systolic and 96% has controlled diastolic with mean level of 135 $\pm$ 17.742 mmHg and 72 $\pm$ 14.255 mmHg respectively for systolic and diastolic. The mean level of total cholesterol is 4.9 $\pm$ 1.3206 mmol/L (normal) with only 41% having an uncontrolled level, while the mean for triglycerides is 1.8 $\pm$ 1.3263 mmol/L which is considered as slightly high. However, the majority of the patients have controlled triglycerides with 56% of them. As for HDL-c level, 66% of the patients are within controlled level with the mean of 1.3 $\pm$ 0.4119 mmol/L while 60% of patient have uncontrolled level of LDL-c level with the mean reading of 2.8 $\pm$ 1.1659 mmol/L. Uncontrolled LDL-c level are associated with insulin resistance and diabetes mellitus condition which eventually cause the overproduction of triglycerides (Lertwanichwattana et al., 2021.). This condition of controlling the LDL-c and HDL-c level can be improved by replacing PUFA and MUFA types of fat in the daily diet (Noor Azleen, et al., 2021).

Table 4 Health Condition and Biochemical Characteristics

Characteristics	N (%)	Mean ± SD
Health Condition		
Diabetes	105 (63.6)	
Hypertension	121 (73.3)	
Hyperlipidemia	129 (78.2)	
HbA1c Level		7.4 ± 1.7486
Controlled (≤ 6.5 mmol/L)	40 (38)	
Uncontrolled (> 6.5 mmol/L)	65 (62)	
Systolic		135 ± 17.742
Controlled (< 140 mmHg)	79 (65)	
Uncontrolled	42 (35)	
Diastolic		72 ± 14.255
Controlled (< 90 mmHg)	116 (96)	
Uncontrolled	5 (4)	

Total Cholesterol		4.9 ± 1.3206
Controlled (<5.2 mmol/L)	76 (59)	
Uncontrolled	53 (41)	
Triglycerides		1.8 ± 1.3263
Controlled (<1.7mmol/L)	72 (56)	
Uncontrolled	57 (44)	
HDL		1.3 ± 0.4119
Uncontrolled	44 (34)	
Controlled (>1.0 mmol/L)	85 (66)	
LDL		2.8 ± 1.1659
Controlled (<2.6 mmol/L)	52 (40)	
Uncontrolled	77 (60)	

4.3 Dietary Intake

As for dietary intake data, the mean for energy intake in units (kcal) is 1475 ± 387.071 kcal per day. A study shows that insufficient daily energy intake can be due to physiological changes of less hunger for the elderly, dental problems, social factors of living alone and also low intake for morning snack and dinner time (Hurree, et al., 2016). For carbohydrate intake, the mean intake is 52 ± 9.173 % and 14 ± 11.599 % for protein. While for fat, the mean daily intake is 35 ± 8.753 %. Recommendations for fat intake by WHO is to not exceed 30% from daily intake especially in order to reduce the risk of developing NCD especially from saturated and trans fat. Excessive fat intake in daily consumption can cause lipogenesis in the liver and at the same time increase the level of triglycerides and total cholesterol as well as reduce the level of LDL-c level in the blood (Nughraheni, et al., 2018).

Table 5 Dietary Intake

	Mean ± SD
Energy Intake (kcal)	1475 ± 387.071
Carbohydrates Intake (%)	52 ± 9.173
Protein Intake (%)	14 ± 11.599
Fat Intake (%)	35 ± 8.753

4.4 Nutrition Intervention

The highest nutrition intervention or the prescription to elderly patients in this study is to do diet modification of fats which is 51%, followed by 49% of them need to do carbohydrate modification while the other 42% for fibre modification. Nutrition intervention of fat is the highest because in this study itself shows that 40% of the elderly patients has uncontrolled lipid profile of total cholesterol and triglycerides level while the other 34% hyperlipidemia patient has uncontrolled HDL-c level as well as 60% of them has uncontrolled LDL-c. American Heart Association said that by replacing saturated fatty acid with Polyunsaturated Fatty Acid (PUFA) and Monounsaturated Fatty Acid (MUFA) will help to improve LDL-c and HDL-c level of the patient. For threating or controlling the HbA1c level for diabetes patient, American Diabetes Association recommend to modify patient's intake in their diet by choosing more complex carbohydrate as well as to include 4-6 servings of non-starchy vegetables besides increase fibre intake. Complex carbohydrate will take longer time to be digest and at the same time will give extra hours of fullness while control glucose fluctuations. Soluble fibre will form a like-jelly substance that will help to control blood glucose and cholesterol level at the same time (CDC, 2022).

Table 6 Nutrition Intervention prescribed by Dietitians

Characteristics	N (%)
Carbohydrate Intervention	
Yes	80 (48.5)
No	85 (51.5)
Protein Modification	
Yes	29 (17.6)
No	136 (82.4)
Fat Modification	
Yes	84 (50.9)
No	81 (49.1)
Sugar Modification	
Yes	23 (13.8)
No	142 (86.1)

Fibre Modification	
Yes	68 (41.2)
No	97 (58.8)
Sodium Modification	
Yes	44 (26.7)
No	121 (73.3)

4.5 Differences of Health Condition and Biochemical Parameters between Gender and Age Group.

In the table 7 shows that there is no significant difference between gender and diabetes, hypertension and hyperlipidemia of elderly patients at dietetic clinic HPUPM. However, these studies show, there is a significant difference between gender and diabetes in which females have higher prevalence of diabetes with 27% compared to male with 23%. This is due to females having higher body fat composition compared to males. There is also a study about there are significant differences between hypertension for older women compared to older men due to low levels of oestrogen in the body which makes females have higher chances of getting hypertension (Zhang, et al., 2019). Another study also showed that there is no significant difference between gender and hypertension among older adults; however, gender-specific socio-behavioural and clinical factors are

associated with hypertension and females with higher education level are able to control their BP level better than higher education male (Chu, et al., 2015). There is no significant difference between age group and health condition of elderly patient at HPUPM and this is supported by a study that also shows there is no significant difference between age group and health condition of hypertension where the prevalence for elderly under 75 years old is 45.78% while for elderly 75 years old and above is 44.94% (Eshkoor, et al., 2016).

For comparison between HbA1c level to the gender at table 8, this study resulted in significant differences of HbA1c level between males and females where males has higher HbA1c level compared to females. Some of the factors is that males has higher blood pressure and blood lipids profile that contribute to the situation while contributing factors to the rising of HbA1c level of females are physiological changes (Ma, et al., 2021). However, a study shows that there is no significant difference between gender and HbA1c level where 23.6% of females are able to control their diabetes while only 19.9% of males are able to do that (Kiau, et al., 2015). Then, there is no significant difference between age group and HbA1c level with age group 75 years and above having higher reading of 7.8 mmol/L. A study between age group and gender shows there is no significant difference between males and age group, however there are significant differences between female and age group for HbA1c level (Huang, et al., 2021). However, another study shows that there are significant difference between age group and HbA1c level where it was caused by body changes through ages are pancreatic islets function declines gradually, decrease of tissue sensitivity to the insulin and insulin receptor as well as reduction of muscle tissue in the body (Ma, et al., 2021).

Table 7 Comparison of Health Condition and Biochemical Parameters between Gender and Age Group

	Gender				Age Group			
	Male (N = 87)	Female (N = 78)	χ^2	P- value	60-74 yrs (N = 147)	≥75 yrs (N = 18)	χ^2	P- value
Diabetes			0.96	0.757			0.409	0.522
Yes	56 (64)	52 (67)			95 (65)	13 (72)		
No	31 (36)	26 (23)			52 (35)	5 (28)		
Hypertension			0.368	0.544			2.825	0.093
Yes	61 (70)	58 (74)			103 (70)	16 (89)		
No	26 (30)	20 (26)			44 (30)	2 (21)		
Hyperlipidemia			0.545	0.460			0.887	0.346
Yes	72 (83)	61 (78)			117 (80)	16 (89)		
No	15 (17)	17 (22)			30 (20)	2 (21)		

Table 8 Result of Independent t-test on HbA1c level between Gender and Age Group

	Mean ± SD	**t-value**	**p - value**
Gender		2.212	**0.029***
Males	7.7 ± 1.9088		
Females	7.0 ± 1.4863		
Age Group		-1.055	0.294
60-74 years	7.3 ± 1.7527		
≥75 years	7.8 ± 1.7086		

*Significant at $p < 0.05$

Table 9 of comparison of systolic level between gender and age group shows that there is no significant difference of systolic blood pressure between elderly patient and gender and it is supported by other study that also shows that there is also no significant difference (Shirani, et al., 2011). Women has higher level of blood pressure compared to man due to hormonal changes after menopause where the menopause-related hormonal will cause weight gain as well as higher blood pressure to women. As ageing, the level of oestrogen in a woman's body reduced and cause the blood vessels become less flexible and finally causing higher pressure (Chen, et al., 2014).

Table 9 Result of Independent t-test on Systolic level between Gender and Age Group

	Mean ± SD	**t-value**	**P - value**
Gender		0.147	0.883
Males	135 ±17.199		
Females	135 ± 18.462		
Age Group		-0.563	0.575
60-74 years	135 ± 18.459		
≥75 years	138 ± 12.220		

For comparison of diastolic level between gender and age group of table 10, this study shows that there is no significant difference between diastolic level and gender as well as the age group of the elderly patient. However, a study shows that there is significant difference between diastolic level between age group and gender of the elderly patient because the changes of the trend of blood pressure in woman can be relate to physiological hormonal changes of oestrogen where menopausal women tend to has higher level of blood pressure compared to man (Shirani, et al., 2011).

Table 10 Result of Independent t-test on Diastolic level between Gender and Age Group

	Mean ± SD	**t-value**	**P - value**
Gender		1.974	0.051
Males	75 ±14.699		
Females	70 ± 13.387		
Age Group		0.967	0.336
60-74 years	73 ± 14.718		
≥75 years	69 ± 10.535		

For table 11, there is a significant difference between total cholesterol level and gender where it shows that females have higher levels of cholesterol compared to male patients. It was supported by another study that shows female has significantly higher cholesterol level compared to male because of the hormonal changes in menopausal female body (Hambali, et al., 2021). Then, there is no significant difference between age group and total cholesterol level where in this study shows that age group 60 to 75 years old has higher TC compared to age group of more than 75 years old. Total cholesterol were expected increasing with the factors of increasing of waist circumference and body fat which is female are usually has higher body fat composition compared to male besides being obese, high glucose reading and sedentary also will increase the level of total cholesterol level (Souza, et al. 2015; Feng, et al., 2020).

Table 11 Result of Independent t-test on Total Cholesterol level between Gender and Age Group

	Mean ± SD	**t-value**	**p-value**
Gender		- 2.041	**0.043***
Males	4.7 ± 1.4600		
Females	5.1 ± 1.0984		
Age Group		0.326	0.649
60-74 years	4.9 ± 1.3573		
≥75 years	4.7 ± 1.0494		

*Significant at $p < 0.05$

This study also found that there is no significant difference between mean of triglycerides level between males and females as well as between age group of 60-74 years and elderly age 75 years and above based on the table 12. It was supported by another studies that also shows there is no significant difference between both gender and age group of the elderly (Marhoum, et al., 2013).

Table 12 Result of Independent t-test on Triglycerides level between Gender and Age Group

	Mean ± SD	**t-value**	**p-value**
Gender		1.276	0.204
Males	1.9 ± 1.6792		
Females	1.6 ± 0.7198		
Age Group		0.588	0.557
60-74 years	1.8 ± 1.4063		
≥75 years	1.6 ± 0.4505		

Between HDL-c level and gender, there is significant difference with p-value of 0.001 while there is no significant difference of HDL-c level and age group regarding results in table 13. A study supported this result with a statement of HDL-c level are higher in woman when compared to man in several countries including Korea, Belgium, Canada

and China. This can be explained by the existence of oestrogen in women bodies that act as a reducer of metabolic activity of macrophages by lipid accumulation but the other way round testosterone hormone in male bodies act to increase the metabolic activity of lipid accumulation (Kim, et al., 2011). HDL-c level are decreasing with older age, smoking, overweight and obesity and also higher triglycerides which at the same time increase the risk of mortality due to cardiovascular disease. However, there are also studies that shows mortality risk are not associated to the HDL-c level where the lower risk of death are associated with highest HDL-c and may not always reflect the risk of having Atherosclerosis Cardiovascular Disease ASCVD (Li, et al., 2019; Madsen, et al., 2017; Hamer, et al., 2018).

Table 13 Result of Independent t-test on HDL level between Gender and Age Group

	Mean ± SD	**t-value**	**p-value**
Gender		-3.409	**0.001**
Males	1.2 ± 0.4406		
Females	1.4 ± 0.3367		
Age Group		0.746	0.452
60-74 years	1.3 ± 0.4250		
≥75 years	1.4 ± 0.3043		

Based on table 14, there are no significant difference of LDL-c level between gender and age group where there are another studies that also support the result with no significant difference between LDL-c level and gender (Marhoum, et al., 2013). It was reported that as the age increasing, the LDL-c level will be decreasing for the population of 90 years where they have the lowest reading (Postmus, et al., 2015). Results for this study also shows that age group of 75 years and above has lower LDL-c level compared to those less than 75 years old.

Table 14 Result of Independent t-test on LDL level between Gender and Age Group

	Mean + SD	**t-value**	**P-value**
Gender		0.309	0.166
Males	2.7 $\pm$ 1.2836		
Females	3.0 $\pm$ 1.0028		
Age Group		0.292	0.769
60-74 years	2.8 $\pm$ 1.1987		
$\geq$75 years	2.7 $\pm$ 0.9284		

CHAPTER 5

CONCLUSION, STRENGTHS, LIMITATIONS AND RECOMMENDATIONS

5.1 Conclusion

Based on this study, it can be observed that many of the patients unable to controlled their biochemical parameters of their health condition with HbA1c and LDL-c are the top 2 uncontrolled parameters among the patients. It was supported by studies that show how uncontrolled diabetes are related to higher level of triglycerides and HDL-c level (Zhang, et al., 2019; Lertwanichwattana, et al., 2021). Then, the highest proportion for health condition of elderly patient at dietetic clinic is hyperlipidemia with 78.2% and followed by hypertension and diabetes with factors of high BMI, having uncontrolled diabetes and hypertension can cause them to have uncontrolled lipid profile (Souza, et al. 2015; Feng, et al., 2020).

Apart that, this study also shows that there is significant difference between HbA1c level, Total Cholesterol and HDL level to the gender of elderly patient in dietetics

clinic HPUPM with p-value of 0.029, 0.043 and 0.001 respectively. Few study shows that man has higher mean value of HbA1c level and one of the reason for the situation to be happen is because males has higher blood pressure level compared to females (Ma, et al., 2021; Kiau, et al., 2015; Huang, et al., 2021). While females has higher mean of total cholesterol and HDL-c level compared to males and it might due to hormonal changes which happen after menopausal phase, higher body fat composition, high sedentary and reduction of oestrogen reduced the metabolic activity of lipid accumulation and same findings also can be seen from different countries of Korea, Belgium, Canada and China (Kim, et al., 2011; Souza, et al. 2015; Feng, et al., 2020). However, testosterone hormone in male bodies act to increase metabolic activity and this condition able to control their lipid profile (Kim, et al., 2011).

5.2 Strengths

Strengths of this study is that it will provide characteristics of the elderly patients with NCD including the data of patients with controlled and uncontrolled status, their dietary intake through diet recall done by dietitians, as well as the intervention prescribed by the dietitian to them. Some of the patient's data was recorded in the database but some are not and with this data, detail information about this population, the differences about the health condition as well as the biochemical parameters of this population in this study between gender and age group. Most of the studies about NCD and elderly were about occurrence, prevalence and association (Ma, et al., 2016; Santos, et al., 2019; Madsen, et al., 2016). Apart that, Hospital Universiti Putra Malaysia only has been operating for around 3 years since 2019 and this study will help them to do the audit or to observe their

progress in managing Non Communicable Disease in the dietetic clinic. Then, this data collected at outpatient dietetic clinic can be use as a tool to do quality improvement of their clinical practice.

5.3 Limitations

This study only covers elderly patients at dietetic clinics without involving other categories of patients so it only reflects the characteristics of the elderly populations only and others might have different characteristics. Then, this study only show characteristics of elderly patient at dietetic clinic only and may not representing the characteristics of other eldelry patients at different hospital even with the same health condition with NCD. Other limitations of this study is that the dietary intake of patients are in percentage unit and not the exact amount of gram (g) which make us unable to determine whether they consume sufficient amount of macronutrients per kilogram of their body weight. In addition to that, elderly are prone to malnutrition and can lead to excessive weight loss as well as muscle wasting and this data of per kilogram body weight can determine whether they eat sufficiently or not (Landi, et al., 2018).

5.4 Recommendations

One of the recommendations is to compare between two groups of adults and elderly based on their characteristics of biochemical parameters, dietary intake as well as the nutrition intervention prescribed. Then, this study can also trigger an idea of a new topic for upcoming studies by using the findings from this study such as the relationship

between dietary intake and biochemical parameters of the elderly outpatients at dietetic clinic HPUPM. Other study that can be further explore are patient's adherence to the intervention prescribed by the dietitians at dietetic clinic HPUPM. Besides, study about their progress of their biochemical parameters between visits to observe their progress as well as their adherence to the nutrition intervention prescribed.

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APPENDIX A: TURNITIN REPORT

203388_AQILA YUSRI_DTK_THESIS FINAL DRAFT

ORIGINALITY REPORT

3%	3%	1%	1%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	hdl.handle.net Internet Source	1%
2	Submitted to Universiti Putra Malaysia Student Paper	1%
3	www.iosrjournals.org Internet Source	1%
4	hpupm.upm.edu.my Internet Source	1%
5	www.nutriweb.org.my Internet Source	1%

APPENDIX B :

Gantt Chart

	10/ 21	**11/ 21**	**12/ 21**	**1/ 22**	**2/ 22**	**3/ 22**	**4/ 22**	**5/ 22**	**6/ 22**	**7/ 22**	**8/ 22**
Proposal preparation											
Submission of Proposal											
Preparation of Proposal Presentation											
Proposal Presentation											
Correction of Proposal											
Preparation of Ethics Approval/Letters											
Data Collection and Analysis											
Data Analysis Presentation											
Final Report preparation											
Poster Preparation											
Submission of Final report											

Final Report Presentation											
Scientific Article Preparation											
Research Poster preparation											
Poster Presentation											
Correction of Final Report											

APPENDIX C : DATA COLLECTION FORM

PATIENT BACKGROUND

MRN NO.	DATE OF APPOINTMENT	AGE	GENDER	RACE	HEALTH CONDITION (DTM / HTN / HPL)
001					
002					

BIOCHEMICAL PARAMETERS

MRN NO.	DM	Hypertension		Lipid Profile						
	HbA1c	Sys	Dia	TC	TG	HDL	LDL	BW (kg)	Height (cm)	BMI (kg/m2))
001										
002										

DIETARY INTAKE DATA COLLECTION FORM

MRN NO.	Total Energy (kcal)	Carbohydrate		Protein		Fat	
		kcal	%	kcal	%	kcal	%
001							
002							

NUTRITION INTERVENTION DATA COLLECTION FORM

MRN No.	Energy Modi	Carbs Modi	Protein Modi	Fat Modi	Sugar Modi	Fibre Modi	Sodium Modi
001							
002							

ETHICS COMMITTEE FOR RESEARCH INVOLVING HUMAN SUBJECTS (JKEUPM)
UNIVERSITI PUTRA MALAYSIA

Research title	:	**Observational Study Of Elderly Patient Characteristics At Dietetics Clinic, Hospital Pengajar Upm (Hpupm).**
Study Site	:	**Hospital Pengajar Universiti Putra Malaysia,HPUPM.**
JKEUPM Ref No.	:	**JKEUPM-2021-896**
Researcher	:	**Nur Aqila Binti Yusri, Nur Dhamirah Binti Khairuddin**
Supervisor	:	**Assoc. Prof. Dr Siti Nur' Asyura Binti Adznam**

Documents received and reviewed with reference to the above study:

1. Ethics Application Form, Version 1 dated 29/12/2021
2. Proposal (English), Version 2 dated 07/02/2022
3. Secondary Data (English), Version 1 dated 29/12/2021
4. Curriculum Vitae of:
   a. Assoc. Prof. Dr Siti Nur' Asyura Binti Adznam

The University Research Ethics Committee, Universiti Putra Malaysia (JKEUPM) operates in accordance to the ICH-GCP Guidelines.
Decision by JKEUPM:

[X] Approved

[X] **Permission MUST BE OBTAINED from the respective hospitals/ institutions before conducting the research**

[ ] Disapproved

Please note that the approval is **VALID UNTIL 07 FEBRUARY 2023**

Researchers should comply with the following:

I. Complete a Study Final Report upon study completion (Form 3.2).

II. Ethical approval is required in the case of amendments/ changes to the study documents/ study sites/ study team.

III. Applicable for Clinical Trial Studies and Clinical interventional Studies only: Progress Report has to be submitted to JKEUPM at every 6 months from the date of approval (Form 3.1). Report occurrences of all Serious Adverse Events (SAEs), Suspected Unexpected Serious Adverse Reaction (SUSARs) and Protocol Deviation/ Violation at all JKEUPM approved sites to JKEUPM. SAEs are to be reported within 15 calendar days from awareness of event by investigator. Initial report of SUSARs are to be reported as soon as possible but not later than

Lampiran

PROTOKOL

Ringkasan Projek Penyelidikan

Tajuk Penyelidikan: ***Observational Study of Health Status and Clinical Characteristics of Elderly Patients at Dietetics Clinic, Hospital Pengajar UPM (HPUPM).***

Nama dan Jabatan Ketua Penyelidik: **PROF. MADYA DR. SITI NUR'ASYURA BINTI ADZNAM, Jabatan Dietetik, Fakulti Perubatan Sains dan Kesihatan**

Nombor Pendaftaran NMRR (jika ada):

Rujukan Kelulusan MREC (jika ada):

Rujukan Kelulusan JKEUPM: **JKEUPM-2021-896**

Tarikh Mula Penyelidikan: April 2022

Tarikh Tamat Penyelidikan: Jun 2022

Objektif Penyelidikan: **Tujuan penyelidikan ini adalah untuk menganalpasti status kesihatan dan ciri klinikal pesakit warga emas di Hospital Pengajar UPM (HPUPM).**

BORANG MAKLUM BALAS PERMOHONAN KEBENARAN PENGGUNAAN HOSPITAL PENGAJAR UNIVERSITI PUTRA MALAYSIA (HPUPM) UNTUK MENJALANKAN PENYELIDIKAN

Tajuk Penyelidikan: ***Observational Study of Health Status and Clinical Characteristics of Elderly Patients at Dietetics Clinic, Hospital Pengajar UPM (HPUPM).***

Nama dan Jabatan Ketua Penyelidik: **PROF. MADYA DR. SITI NUR'ASYURA BINTI ADZNAM, Jabatan Dietetik, Fakulti Perubatan Salins dan Kesihatan**

Pihak HPUPM dengan ini membuat keputusan seperti berikut:

☐ Membenarkan projek penyelidikan dijalankan

☐ Tidak membenarkan projek penyelidikan dijalankan

"Providing Extraordinary Care"

"BERILMU BERBAKTI"

Saya yang menjalankan amanah,

.....

PROF. MADYA DR. HJ MUHAMMAD MOHD ISA
Pengarah
Hospital Pengajar Universiti Putra Malaysia
43400 UPM Serdang, Selangor

s.k. Ketua,
Unit Penyelidikan Klinikal, HPUPM