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Nutritional Intervention in Nursing Home for Diabetic Type 2 Patients

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ABSTRACT

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The study's purpose was to find out how nutritional interventions would contribute to management of patients living with type two diabetes in nursing homes.

The data was collected by descriptive literature review, gathered from PUBMED and CINAHL. The literature was narrowed to ten relevant articles. The articles were combined, grouped into distinct categories making the themes and subtitles of the findings. Articles contain research conducted in Australia, Japan, Czech Republic, America, Saudi Arabia, India, Spain, United Kingdom & Ireland. The chosen articles were written in English and the timeline of the publications between 2014 and 2021.

The finding of the study indicates that modification of diet, healthy food choices, food portion control and meal timing significantly impacted control of blood sugar levels. Further findings showed that metabolic control and weight management were influenced by correct diet. Thus, reducing complications related to type II diabetes. Multi-professional collaboration between family members and patients showed a positive outcome in the management of type II diabetes. Further studies are recommended to find solutions regarding collaborations between nutritionists, food suppliers, caregivers' families of patients with type II diabetes to promote tailored diet for type II diabetic patients.

Key words: geriatrics, diabetes type 2, nutritional intervention, nurses, nursing homes, food

CONTENTS

ABBREVIATIONS

ADA	American Diabetes Association
ARIC	Atherosclerosis Risk in Communities
BMI	Body Mass Index
BT	Bachelor of Thesis
DIRECT	Dietary Intervention Randomized Controlled Trial
DKA	Diabetes Ketoacidosis
DM2	Diabetes Type Two
DPP-4	Dipeptidyl Peptidase Four
GLP-1 RA	Glucagon – Like Peptide – 1, Receptor Agonist
HbA1c	Glycated Hemoglobin
LCM	Low Carbohydrate Mediterranean
MD	Mediterranean Diet
mmol / l	Millimoles per Liter
PICO	Patient/population Intervention Comparison & Outcome
POP	Persistent Organic Pollutants
RCTs	Randomized Control Methods
SALUD	Salutogenic Intervention for Diabetes Type Two
Sc	Subcutaneous Injection
SGLT2-i	Sodium-glucose Co-transporter-2 Inhibitors
TM	Traditional Mediterranean
T2DM	Type two Diabetes Mellitus
WHO	World Health Organization
WOS	Web of Science

1 INTRODUCTION

Prevalence of diabetes is increasing in the European region. Diabetes Mellitus two (DM2 (Diabetes Mellitus 2)) is a preventable lifestyle chronic disease, with risk factors like age, high Body Mass Index, family history. Other risk factors include social standards and environmental conditions. More than 60 million people in the European region suffer from DM2. This causes suffering not only to the patient with their families but also to the health sector plus economic strain to the countries. DM2 can lead to health complications like cardiovascular diseases, kidney failure, blindness, amputation or even death if mismanaged. (WHO 2011.)

There are about 400,000 Finnish with DM2 in Finland out of the 5.5 million countries population. This creates need for nutrition intervention for the elderly with comorbidity at risk of polypharmacy complication. (Finnish Diabetes Association.) Study focuses on analysing nutrition intervention for diabetic type 2 patients living in nursing homes whose nutrition diet is provided for them by others.

Authors of the thesis having experienced working in elderly nursing home found there was need for nutritional intervention in the management of DM2 which are managed pharmacologically. It would be beneficial in keeping records in the relationship between foods versus the blood sugar levels for geriatrics patients who mostly have another comorbidity.

2 THEORETICAL STARTING POINT

Sixty-five-year-olds are considered older adults. The needs for this age group increase as they undergo physical and psychological changes. This includes also poor nutrition and their ability to function on their own decrease. (UNHCR 2020.) Hence most of them are in nursing homes to help them cope in daily activities. A nursing home is a place where people who cannot live alone but being in hospital is not a necessity. This does not mean that only older adults are accepted there, anyone needing 24-hour care can also be admitted. (NIH 2015.)

The thesis focuses on DM2 patients living in nursing homes with other comorbidities like dementia, Alzheimer, cancer, stroke, anxiety etc. DM2 is a metabolic dysfunction caused by either lack of insulin, insulin resistance or insulin insufficiency. Lack of sufficient or no insulin leads to patients suffering from DM2 with situations such as hyperglycemia, which is defined as elevated levels of blood, glucose, hypoglycemia is low level of glucose in blood. Hyperglycemia if left untreated can lead to ketoacidosis (DKA). The onset of DM 2 is mostly in adulthood, occurring due to sedentary lifestyle, alcohol intake, obesity, high blood pressure or fat metabolism disorder. (KÄYPÄ HOITO 2020.)

The normal range of fasting blood glucose is 3.9mmol/L to 5.6mmol/L. With 5.6 mmol/l to 6.9mmol is an indication of prediabetic. In DM2 patient glucose levels range between 7.8 to mmol/l to 11.0 mmol/l. In ketoacidosis the blood glucose levels are over 17 mmol/l. non-pharmacological interventions like lifestyle changes for example, regular exercise, eating food with low glycemic index and monitoring of blood glucose are recommended in management of DM 2. (WHO 2023.) Food and fluids intake affect the blood glucose level in the body and physical activities causing spikes in blood glucose. Food and medications are used in correcting the glucose levels in the bodies. (NIH 2018, 36(2):202.)

Nutritional intervention is a kind of therapy using certain food types aiming in management of certain conditions in the bodies. For example, use of low glycemic index foods prevents spikes in blood sugar levels. (Ojo Ojo Adebowale Wang 2018, 19; 10(3):373.)

Low glycemic index diets are foods that have low effect on blood sugar after consumption example, eggs, fish, apples, avocado, vegetables, berries unsaturated fat, low fiber carbohydrate, versatile fiber rich diet, and whole grains are food that reduces glycated hemoglobin (HbA1c) thus resulting in stabilizing

blood glucose concentrations in the body. (Zafar, Mills, Zheng, Regmi, Hu, & Chen 2019.) These healthy diets in addition to regular meal routines can help maintain normal blood sugar levels. On the hand, high glycemic index diet such as potatoes, white bread, soft drinks, and other processed foods increases the blood sugar level in the body causing sugar spikes. (Finnish diabetes association 2022.)

HbA1c is a form of hemoglobin, (glycated hemoglobin) meaning glucose and blood joined together, HbA1c test shows the average blood glucose level in the patient for the past three months (WHO 2011).

After consumption of foods the glucose levels in normal situations for non-diabetic people should not exceed 7.8 mmol/l. This is of course determined by the number of grams in carbohydrates consumed per serving. For example, 10 grams of carbohydrates rising blood sugar by 2 mmol/l. Diet full of fibre plays a huge role in controlling the blood sugar levels in the body. (Haas 2014.)

Nurses play a key role in the management of the diabetic patient. It is the nurse's role monitoring and ensuring that the residents' blood sugar levels are maintained between the recommended ranges. Preventing adverse effects of hypoglycemia, hyperglycemia thus reducing DM2 related complication. (Irons 2022.)

DM2 health care provider should have enough competence and knowledge about DM2 management including pharmacological interventions. Effectiveness of DM2 medications and awareness of polypharmacy in patients with DM2 who have other comorbidities. (Call, Cortes & Harris 2022, 14-23.)

Care provider having knowledge in management of warning signs like hypoglycaemia which includes patient having agitation, confusion, sweating, fatigue, blurred vision and change in level of orientation. Hyperglycaemia with symptoms like being thirsty all the time, urinating always, weakness, tiredness, and blurred vision. DKA signs, flash face, fruity smelling breath, dry skin and mouth, fast, deep breathing by providing support and attending to patient's needs. DM 2 pharmacological interventions include tablets, short and long-acting Insulin administration. (KÄYPÄ HOITO 2020.)

TABLE 1. Pharmacological interventions of DM 2 (KÄYPÄ HOITO 2020).

Medication group	Description	Route of administration
Metformin	Metformin is a tablet in the line intervention medicine for DM2, it lowers blood glucose levels due to its ability to decrease production of glucose by the liver, usually administered twice a day, recommended to be taken with food to improve efficacy.	Orally Taken just before meal or with food.
Gliptin	DPP-4 inhibitors prevent hypoglycemia by increasing insulin secretion.	Orally with water. Once per day. with or without food.
SGLT2-1	Lower elevated blood glucose. Prevent cardiac complication for DM patients. Side effect is yeast infection.	Orally Taken with meals.
GLP-1 RA	Natural hormones that lower blood glucose and lowering body weight. Prevent heart disease	Injectable - SC 60 min before meal Rybelsus – taken orally
Insulins		
Rapid-acting insulin	Onset 15 min. Peak in 1 hour lasting 2-4 hours. example Novolog	Injection – Sc Before meals
Regular or short acting insulin	Onset 30 minutes after injection. Peaks 2-3 lasting 3-6 hours.	Injection – Sc 30 min before meals
Intermediate acting insulin	Onset 2-4 hours peaks 4-12 hours effectiveness up to 18 hours.	Injection – Sc 15 -30 min before meals
Insulin – long acting	Reaches blood streams hours after injection. Regulates glucose metabolism by lowering blood sugar levels. example Toujeo – start acting in 6 hours lasting about 36 hours. Levemir – lower blood glucose for up to 24 hours.	Injection – Sc Early in the morning or

3 PURPOSE, TASKS, AND OBJECTIVES

3.1 Purpose

The purpose of this thesis was to conduct a descriptive literature review concerning the nutritional intervention for old patients in nursing home with DM2.

3.2 Task

Research question: How can nutritional intervention affect the management of DM 2 for older people in nursing homes?

3.3 Goal & objective

The objective of this study is providing information for health care providers working in nursing home. Nursing students using it as a reference of their studies in the future. It could be used by the patients' significant others in making better food selections for patients in nursing homes. The food suppliers in the nursing homes can benefit from the thesis information as well.

4 METHODOLOGICAL STARTING POINTS

The thesis was conducted using descriptive literature review, studying already available data from the perspective of the author's search question. It is significant for academic research being informed about the topic's existing information to understand the information gap and what still needs discovering. (Xiao &Watson 2019,93-95.) The applied method is literature review used answering author's formulated research questions by planning, managing, and reporting phases (Xiao &Watson 2019,102).

The first step formulating a question answerable using PICO, which is a known tool for framing a comprehensive research question, using this format incorporating components of problem, intervention, control, and outcome (Nishikawa-Pacher 2022).

Secondly identifying the purpose of the study, objectives of the study, searching methods, inclusion as well as exclusion criteria. In addition, screening of results and reporting for quality (Xiao & Watson 2019, 103). English language researched articles, peer reviewed and nursing home residence with diabetes type 2 were majorly included in the criteria for the research.

Using advanced medical databases, journals, articles, and nursing research tools such as PUBMED and CINAHL. Limiting article choices window frame of ten years from the time of publication. Afterwards, considering some articles according to relevancy. Narrowing the found articles to ten most relevant answering the research question. (Marshall & Jonker 2010.)

Finally, analyzing the selected ten articles for answering the thesis question. Key searching words being geriatrics, diabetes type 2, nutritional intervention, nurses, nursing home, and food. Utilization of dictionary, thesaurus like Mesh, CINAHL as well as other free words. There after finding the relationships between all the concepts. (Xiao & Watson 2019, 103-108.)

The organizing stage that followed was screening of the articles found, accessing the literature quality, analyzing, and synthesizing it. The first search in CINAHL being unsuccessful as 500 of the found articles were more focusing on the articles author's original questions. However, after reorganizing the key concepts, the next step was searching for format; (Geriatrics OR older adults OR elderly, aged, OR older) AND (diabetes type OR diabetes mellitus type 2 OR type two diabetes OR type two diabetes mellitus OR dm2) AND (nutrition intervention OR nutrition therapy OR nutrition rehabilitation OR diet therapy), also another 71 articles were found relating to Nutritional management for type 2 diabetes. (Xiao & Watson 2019, 103-108.)

The articles not answering the research questions in a straightforward manner since patients were getting treatment of other comorbidities in additional with DM2. Limiting results to 56 articles. Thereafter, thesis authors thoroughly screened all the 56 articles found and then excluding the data not having been found identifying with thesis question. The excluded data not meeting the inclusion criteria due to the year of publication, data not answering the research question from the theoretical starting point, and the general research question were also excluded. The excluded data not meeting the inclusion criteria due to the year of publication, data not answering the research question from the theoretical starting point, and the general research question were also excluded. After the data process classification and extractions, articles gathered were then limited to 10. (Whittemore & Knafl 2005, 550-551.)

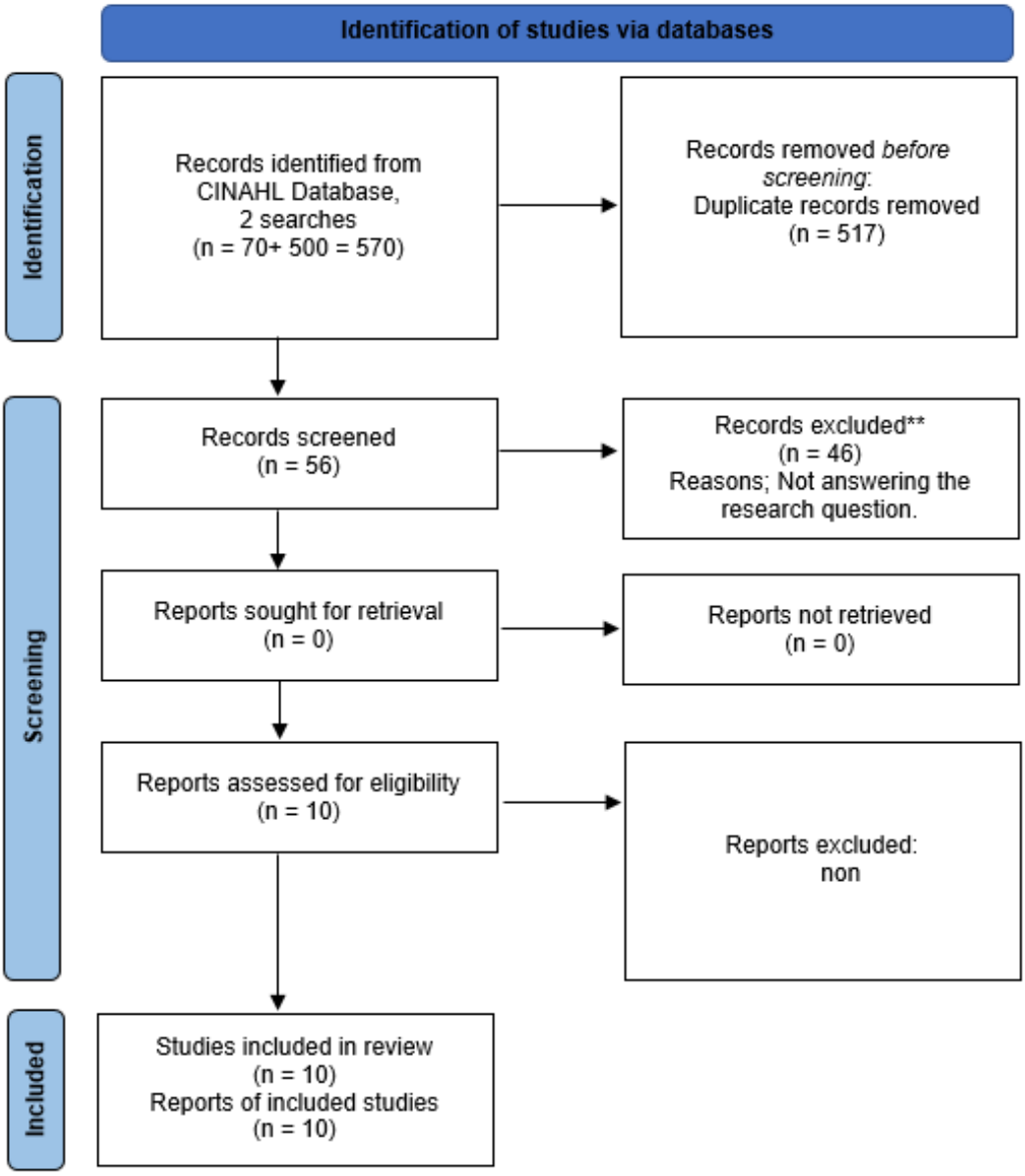

FIGURE 1. Flow chart of the study selection.

Showing the above figure of Prisma flow chart. (Fain 2017, 65).

Articles screened for the thesis were chosen thematically. Data analysing method using descriptive, qualitative, and quantitative. There after focussing on the intervention of nutrition, methods in controlling plus managing DM2 and DM after specifying them in group. The summarized data reporting on rational order in the screening of sentences highlighted from the articles researched that focused on dietary and nutritional intervention for the elderly living in nursing care homes or institutions with focus on the involvement roles of healthcare professionals in

promoting the efficacy of this non-pharmaceutical approach in the nursing homes or institutions. After the phrases were collected from the research articles, coded, data inspection was made to identify commonalities between articles suitable for the theme. (Lambert & Lambert 2012,256.)

During the extraction phase, the comparisons between similar data in the articles making it possible in categorising identical subthemes (Whitte-more & Knafl 2005, 551).

Lastly, after analysing, synthesizing followed the conduction phase of grouping similar extractions. The step including figures, tables, or charts. (Xiao & Watson 2019, 103-108.) Afterwards, subthemes assessment in aim to producing an accurate interpretation of presented data establishing logical data categorization and themes management (Whittemore & Knafl 2005, 550-551).

5 FINDINGS

Finding included reviewing of ten articles answering the research question as shown in Table 4 in Appendix. The articles were published in the following countries Australia, Japan, Czech Republic, America, Saudi Arabia, India, Spain, UK (United Kingdom) & Ireland between years 2014 to 2021. Using systematic review, meta-analysis in retrospective of cohort study, RCTs, case study, research & review as well as cross section studies for measure and design.

The following themes with the subtitles as shown below in figure 2 of the factors affecting nutrition intervention of DM2. Subthemes: What is nutritional intervention, food choices, nutritional intervention, blood glucose level, nurse's role in the dietary or nutritional intervention for Type 2 diabetics patients and healthcare institutions or nursing homes, nutritional therapy, rehabilitation, and management of DM2.

As well as in table 4 of Appendix were the detailed table how figure 2 was create showing themes together with subthemes. Classification of the findings as shown in figure 2 by grouping the ten articles according to the results of the articles answering the research question on how nutritional intervention can affect the management of DM 2 for older people in nursing homes. Four categories were found namely influence of weight management on DM2. Influence of diet in weight management, influence of diet knowledge on DM and influence of support on DM2.

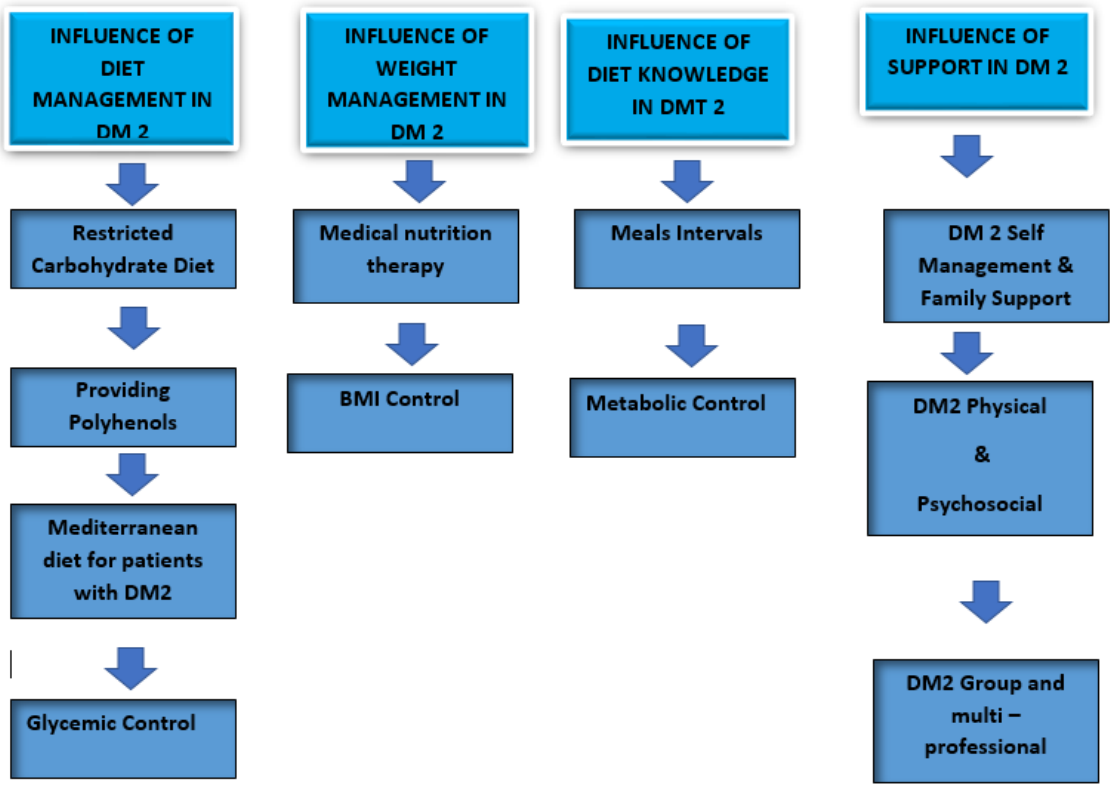

FIGURE 2. Factors affecting nutrition intervention of DM2.

5.1 Influence of diet on DM2

The effects of DM 2 management in the following situation restricted carbohydrate diet, providing polyphenols, Mediterranean diet for patients with DM2 and Glycaemic control.

5.1.1 Restricted carbohydrate diet

The participants in this study involve adult patients with DM2 and overweight or older adults with obesity. The groups participants being carbohydrates restricted and the other being on high carbohydrates diet. In a period of three months of this study, the results showing great reduction of HbA1C in carbohydrates restriction group. (1.)

Another result of the study showed significant weight loss on participants with restricted carbohydrates diet. Study's analysis revealed that the weight loss being

in low carbohydrates diet. Aside from weight loss this study also revealed that the participants with carbohydrates restriction they displayed increase in HDL (High Density Lipoproteins) cholesterol, reduction in triglycerides, great reduction in systolic and diastolic blood pressure. (1.) The review present evidence on the effective of restricted carbohydrates on managing DM2 on adult.

5.1.2 Providing polyphenols

The subjects on this study being with T2DM2. Participants received various kinds of polyphenols but mostly being given extraction or powdered polyphenols foods that rich in polyphenols. Green tea, juice, cinnamon, blueberries, cherries, and dark chocolate bar being the primary source for polyphenols. Subject taking polyphenols supplement daily. According to the analysis of this study, polyphenol intervention significantly lowered HbA1c of the participants. (2.)

5.1.3 Mediterranean diet for patients with DM2

In this study the Goldring Centre for Culinary Medicine group (GCCM) introducing Mediterranean diet to patients with DM2. Results showing there being significant reduction in HbA1C compared to opposing controlled group. (6.) Mediterranean diet including consumption of grains, legumes, vegetables, fruits, monounsaturated fatty acids and limiting amounts consumption of poultry, fish, dairy, red wine, and red meat. This diet being beneficial in preventing heart disease having positive impact on weight loss as well as in patients with DM2. Further results showing that the diet was beneficial in increasing insulin sensitivity. (4.)

5.1.4 Glycemic control

Eating vegetables before carbohydrates showed significant result in glycaemic control. Additionally, this study also showing a positive change in diabetic complications, like kidney failure, nerve damage, build-up of plaque in the arteries, cardiovascular disease, cerebrovascular disease, and hypertension. Having no significant increase in the number of patients with diabetic complication in intervention group compared to the opposing control group. (3.) The study demonstrating that nutritional therapy effectiveness in glycaemic control for patients with DM2.

5.2 Influence of weight management

Medical nutrition therapy and diabetes complication management as well as BMI (Body Mass Index) control influences in weight management of DM2.

5.2.1 Medical nutrition therapy

Being obese among others are major risk factors for DM2. Therefore, weight control consideration as being a valuable tool in management of DM2. Evidence having shown using of medical nutrition therapy as an intervention method to promote management of type two diabetes. Medical nutrition therapy being medical-based approach using nutritional plans tailoring meals individually during treatment of certain chronic illnesses. Ordering, approving, and implementing done by a healthcare provider, physicians, and dietician. Four types of special medical nutrition therapy being considered are vegan diet, vegetarian diets, Mediterranean diet, and low carbohydrate/high protein diet to facilitate the improvement of health in patients with DM 2. Using low-fat calorie restricted diet, vegetarian diet, low carbohydrate diet or Mediterranean diet having been used for medical nutritional intervention in the treatment of DM 2, helping in controlling body overweight, normalizing blood glucose level, and promoting insulin resistance. (5.)

According to the evidence from evaluation of efficacy of nutritional effects twelve months of low carbohydrate content in Mediterranean diet (LCM) or traditional Mediterranean (TM) resulted to significant amount of weight loss. Having a targeted daily calories goal not exceeding the set amount according to the researchers thus helping in reduction of further risk of other comorbidities. Further evidence showing Mediterranean diet riches in fibre alone helping in increasing satiety level, thus reducing calorie intake and positive effectiveness in improving postprandial glycaemia as well as lowering the HbA1c. Thus, facilitating in DM2 management as well as minimizing large blood vessels and small blood vessels diabetes complications. (5.)

5.2.2 BMI Control

According to studies vegan diets being described abstaining from eating all meat, animal-derived products. Whereas vegetarian diets include vegan diets but include eggs and dairy products. Further studies show some vegetarian food including nondairy milk having added calcium and vitamin D supplement and some protein as meat substitute. Regardless of the diet of choice, paying attention to patient weight being crucial in DM2 management in nursing homes thus preventing further complications and maintaining blood glucose level. Worth noting a BMI of over 25 being common with patients having diabetes type 2. Therefore, diet strategy and nutritional goals including weight control are not being overlooked. (4.)

The present study shows evidence that vegetarian diet has helped in decreasing body weight. The team members caring for the patient, such as healthcare giver or nurses, being responsible for planning and serving meals to the elderly. According to the study on sample patients on vegan diet, results showed the effectiveness of the diet; in weight reduction, controlling blood sugar levels, increasing insulin sensitivity, reducing the fats that wrapped around the organs. The participants' daily diet consists of 15 % fat ,15% protein and 60% total energy carbs (vegetables nuts, legumes. Additionally, adherence to vegetarian diet requiring the average daily cholesterol < 100 mg, according to the analysis done after 2 weeks, with the control trial group. Evidence shows body weight reduction

in patients having type 2 diabetes while on the dietary intervention with vegetarian diet. (4.)

5.3 Influence of diet knowledge in DM 2

Improvement in dietary knowledge having been vital in management of DM2. Food selection, meal intervals, timing of meals as well as metabolic control.

5.3.1 Meal’s intervals

Nutrition being significant aspect of managing diabetes. Improper controlling and poor management of diabetes causing damage to many organs in the body. According to study, comparisons having made between diabetes type two patients in various demographics in the world verses diets effects on patient with DM2. Blood glucose level having abnormal elevation because of consumption of soft drink, fat, and sugar. Henceforth, such diet not being recommended food choices for someone with DM 2. (7.)

Food choices, sizes and portion control having been crucial elements being considered when treating a patient with DM2 in the nursing home. Healthcare professionals' accessibility appropriating knowledge of patient's cultural background and addressing of cultural needs is incredibly important. Simply because diets having been affected by cultural influences like eating pattern around the world. Implementing nutrition diet plans that puts patients own choices into consideration thus, making it easier for both parties in collaborating work together achieving nutrition related goals. The common goal being improving the quality of life for the patient via nutrition. Recommending of low-fat meal, low carb meal and meals high in fibre. Unhealthy eating habits having been assessed and monitoring of patient's visitors bringing unhealthy snacks to the nursing home facilities or institution. (7.)

5.3.2 Metabolic control

Metabolic control having been important in managing DM2. The study showing that dietary modification like eating healthy foods in combination with healthy lifestyle habits for example, active lifestyle leading to reduction of elevated HbA1c as well as its complication. Mediterranean diet, with olive oil, fish, abundant fruits, and vegetables having effects in decreasing patients' symptoms. Further showing reduction in complications of DM2 as well as obesity. Healthcare providers in nursing homes playing a key role in DM2 management by eliciting positive attitude from the patient towards own nutritional care within the facility. Through collaborative effort of all key players including patient, relatives and healthcare givers or nurses in helping patients achieve their goal. (7.)

5.4 Influence of support on DM2

Support of the patient in management of DM 2 is significant in achieving of the set goals improving the quality of life.

5.4.1 DM2 self-management and family support.

Self- management behaviours in diabetes management (8) showed that majority of the participant being able in following good self-management habits. By following healthful eating plan every day of the week. According to the finding none of the participant ate five or more servings of fruits and vegetables however, having all avoided high fat foods example, red meat or full-fat dairy products. Further finding showing that with minimal participating to at least thirty minutes of exercise as well as foot care having a positive result in DM2 management. The family support or encouragement having been limited not even in medication therapy according to the findings. Having been more of criticizing, nagging, arguing, or pushing the patient into adopting healthy lifestyle thus hampering DM2 management. Self-management good habits (diet & blood testing) were positively reflected in glycaemic control with complete lacking many forms of family support. (5.)

However, having been found the importance of informing patients and relatives of these options and carrying them along in nutritional care and selection of favorable ingredients and meals. Thus, diet being tailored according to patient's individual preferences and culture. By doing so, the patient continues enjoying the pleasure of eating and having been able to sustain the diet plan. This leads to the promoting of adherence to treatment, improving meal therapy efficacy and overall long-term controlling of diabetes DM2 symptoms and complications. (5.)

5.4.2 DM2 physical and psychosocial support

Inclusion of health care providers and scientists in management of DM2 management (9) using of available resources in empowering everyday life behavioural changes. The salutogenic intervention focusing on group intervention in the management of DM2 thought out the studies. According to the finding sharing of experiences after setting goals with self-examination resulted to healthy eating in conjunction with having continuous guidance face-to-face time. Other factors into consideration in the group support being not only healthy eating but also multiple improvement of health. For example, correct nutrition intake this being in cooccurrence with patients' literacy on disease, food, self-acceptance, stress management, self -identify as well as social support. Study showing that lifestyle coaches for DM2 patients with support of nurses resulted in improvement of better nutritional intake, HbA1c and self-efficacy thus improving the BMI. Further finding showed that social support having been very essential for DM2 patient especially with intervention group activities like learning of skills for example, cooking workshop, group exercises (relaxation/mindfulness) or nature walking. Emphasising trust building in group sessions thus goal commitment, motivation from the social support thus resulting to better DM2 management. (9.)

5.4.3 DM2 Group and multi-professional support

Lifestyle intervention namely food as well activities being it individual or group activities showing a significant difference in weighed mean difference (WMD). The finding showing better results in lower WMD on the group's activities compared to individual interventions. (10.)

6 DISCUSSION

The thesis writing is done according to the research ethics. Ensuring data protection, confidentiality as well autonomy. Obtaining the search permits accordance in line of all the protocols of the search ethics.

6.1 Ethics and reliability

According to the European code of conduct for research integrity the researcher/s ensuring quality of research by abiding to the four principles. The principle of reliability, respect, honesty, and accountability. For instance, all the resources been reliable and up to date, acknowledging the original authors. Honest in reporting, interpreting the data gathered, preventing falsification, fabrication, and plagiarism. (ALLEA 2017.)

Application for permit of writing a bachelor of the thesis starting with the authors planning, writing according to TAMK thesis writing guidelines. Applying for contract with TAMK (TAMK 2019.)

Acknowledgement to expert supervisors, making the thesis study. Providing guidance in all the thesis stages and process. (ARENE 2018.)

6.2 Conclusion

These findings from literature review bringing out that with restricting to low carbohydrate diet there have been significant weight loose in the participant as well as increasement in HDL. Finding showing good management in blood pressure control in both systolic and diastolic blood pressure with reduction of triglycerides. Mediterranean and polyphenols kind of diets showing effectively lowering the levels of HbA1c. Overall, foods found effective with lowering HbA1c included all low glycaemic index foods. (1 2 3 4 6.)

Further findings found that weight management having been beneficial in promoting DM2 management. Medical nutrition therapy involving using tailored individual meals for example, vegan, vegetarian, Mediterranean as well as low carbohydrate diets showing beneficial results in management of weight. Patients' involvement in their own meal plans showing lots of individual attitude improvement towards perceptions of diverse types of foods. Thus, resulting into dietary intervention helping in reducing body weight of the individuals. The most effective being vegan diet, vegetarian diet in maintain a controlled BMI. (5 4.)

Having constant meals intervals being found significant in controlling and management of DM2. Reasonable portions per serving, correct food choices contribution into stabilizing blood glucose. Controlling of metabolic using various foods being significate in DM2 management. Foods like olive oil, fish, low glycaemic index fruits and vegetables having found in decreasing sugar spikes in the blood thus reducing DM2 complications. Good collaboration between family members and the patients being highly recommended thus avoiding supplies of high glycaemic index foods to the patients. (7.)

Different type of support offered to DM2 patient showing positive outcome in contribution towards its management. Patients' attitude towards the disease, medication, and self-management being the starting point. Following with multi-professional collaboration in conjunction with family members' support. Group interventions helping in self-acceptance thus, contributing into healthy eating and reducing stress hence having better outcome in the control of DM 2. (8 9 10.)

Some research presented in thesis had a small, controlled study sample. The sample studied varied between 25 – 300 participants. In future studies, more data around the topic should be researched to benefit patients with DM2. More information is needed about the nutritionist, food suppliers and organizational collaboration in provision of nutritional therapy to improve the quality of life of DM2 patients living in nursing homes both in Finland and globally.

6.2.1 Benefits of the finding to nursing home

These findings could benefit all the persons that involve in the care of the patient in nursing home, in a sense that through collaboration they can plan a suitable healthy diet for the patient with DM2. Through patient education regarding DM2 and diet, presenting healthy diet plan to patient will be facile. On the other hand, nurses should still respect the patient's choice.

Knowing these concepts, like limiting carbohydrates, eating carbohydrates first, taking polyphenols and Mediterranean diet is favourable both to the healthcare workers in nursing home and to the patient. It is because these diets can help reduce the blood glucose level of the patients with DM2, increase good cholesterol and as well as increasing the insulin sensitivity of the patient which is crucial for patients with DM2. Managing the patient's diabetes is important in decreasing the risk of DM2 complications and in having a having a good quality of life.

Diet management education such as medical nutrition therapy, mentioned above can be implemented by healthcare workers and other multi-professional teams working in the nursing homes to help in weight reduction, lowering of glycated haemoglobin and promoting insulin sensitivity in DM2 patients living in nursing homes.

Healthcare workers in nursing homes can use monitoring of meal timing, meal portions and meal intervals in controlling DM2 symptoms associated with irregular eating patterns by DM2 patients living in nursing homes.

Influence of support findings could be beneficial in nursing home for the patients with DM2. Care providers and family supporting the patients in food choices by providing low glycaemic index foods. Encouragement patients' self-management habits by offering low glycaemic index foods in nursing homes. Incorporating diet changes without arguing, pushing, or nagging possibly by changing the diet in phrases while respecting the patients' choices. Supporting self- disease management letting the patients those who can take measurements of blood

glucose by themselves. Having patients attend like diabetes workshops where they can demonstrate and be shown the techniques involved.

Having multi-professional involvement in interventions of DM2 management in nursing homes like dieticians' workshops session with the patients. Organising support diabetes support day awareness in the nursing homes thus giving the patients chances of expressing their feelings. Nursing homes organising cooking workshops with chances where the patients are offered low glycaemic index ingredients to choose from. Apart from focusing on foods having group exercises examples nature walks, more time spending outdoors. Lastly monitoring of body weight by nurses measuring patients body weight like twice a month and acting on the results accordingly.

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8 APPENDICES

8.1 Appendix. TABLE 2: Search Word.

Dictionary/thesaurus	**Concept 1** **Geriatrics**	**Concept 2** **Diabetes mellitus**	**Concept 3** **Nutrition**	**Concept 4** **Nursing home**
MeSH	Aged	Glucose intolerance Diabetic Hyperglycaemia	Food Diet Nutrition requirement	Nursing home
CINAHL	Geriatrics Older adults Elderly	Diabetes type 2	Food Diet Nutrition	Care home Residential care Aged care facility
Free word	Old age	Diabetes mellitus	Nutrition education Nutritional condition	Nursing home

8.2 Appendix. TABLE 3: Key search results.

Date	Database	Search phrase	Limitations	Results	Evaluate
29.09.22	CINALS (Ebsco)	Geriatric or older adults or elderly, aged, older, or over 65 Diabetes type 2 or diabetes mellitus type 2 or diabetes 2 or t2dm or type two diabetes or type two diabetes mellitus or dm2. Nutrition intervention or nutrition therapy or nutrition rehabilitation	Peer Reviewed, Date: 203-2023 Language: English Age: 65+ Region: Europe	12	Most relevant
Sainsbury, E., Kizirian, N.V., Partridge, S. R., Gill, T., G., Colagiuri, S. & Gibson, A. A. 2018. Effect of dietary carbohydrate restriction on glycemic control in adults with diabetes: A systematic review and meta-analysis. Diabetes Research and Clinical Practice. vol 139. pp. 239-252. doi.org/10.1016/j.diabres.2018.02.026.					
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8.3 Appendix. TABLE 4: Further Searches.

Author, Title, Journal, Publication year, Country	**Purpose of the research**	**Method** **Study population**	**Main results**
Haas, L.B Special Considerations for Older Adults with Diabetes Residing in Skilled Nursing Facilities. Diabetes Spectrum. vol.27 (1): 37-43. 2014. USA	The purpose of the study is to analyze the need and special consideration of diabetic patient needs who live in nursing facilities.	Literature review	The goal in the prevention of long-time complications in diabetic patients in care facilities is to control blood sugar combined with medical nursing. In addition, diabetes education programs for health care workers.
Nitta, A., Imai, S., Kajiayama, S., Matsuda, M., Miyawaki, T., Matsumoto, S., Kajiyama, S., Hashimoto, Y., Ozasa, N., Fukui, M. Impact of Dietitian-Led Nutrition Therapy of Food Order on 5-Year Glycemic Control in Outpatients with	The purpose of the study was to evaluate glycemic control (blood sugar) on type 2 diabetes in a care clinic following five years of medical nutrition eating carbohydrates after vegetables.	Literature review Data analysis.	The results showed that there was a significant control of blood glucose by eating vegetables before carbohydrates which dropped to about 10mmol/l.

Type 2 Diabetes at Primary Care Clinic: Retrospective Cohort Study. Nutrients, vol 14 (14), 2865. 2022. Japan.			
Sainsbury, E., Kizirian, N.V., Partridge, S. R., Gill, T., G., Colagiuri, S. & Gibson, A. A. Effect of dietary carbohydrate restriction on glycemic control in adults with diabetes: A systematic review and meta-analysis. Diabetes Research and Clinical Practice. vol 139. pp. 239-252. 2018. Australia	The study's purpose was to compare the blood sugar levels on individuals with diabetes type 2 who were on carbohydrate-restricted diets compared with a high-carbohydrate diet.	A systematic review and meta-analysis	Results showed that restricted carbohydrate diets individuals had reduced HbAIc which would be beneficial in the plan of diabetes management.

8.4 Appendix 5. Description of qualified studies.

Authors, year, and country	Purpose	Measure and design	Sample	Influence of diet on DM2
(1) Sainsbury, E., Kizirian, N. V., Partridge, S. R., Gill, T., Colagiuri, S. & Gibson, A. A. 2018. Australia	To evaluate the effects of diets that are restricted to 45% total energy of carbohydrate compared to high carbohydrate diets of more than 45% total energy glycemic control in adults with diabetes mellitus.	Systematic review and meta-analysis.	Data collected sample included 25 randomized controlled trials involving (n=2412) diabetic adults.	Influence of diet on DM2 Restricted carbohydrates diet. Ketogenic diet.
(2) Palma-Duran, S. A., Vlassopoulos, A., Lean, M., Govan, L. & Combet, E. 2014. UK.	To assess the evidence for polyphenol interventions on HbA1c in non-diabetic, pre-diabetic, and type 2 diabetes mellitus (T2DM) subjects.	Systematic review and meta-analysis	36 RCT (Randomized Controlled Trial) with **HbA1c** values were included. All subjects (n=1954); inclusive were non-diabetic, pre-diabetic and DM2.	Influence of diet on DM2 Providing polyphenols
(3) Nitta, A., Imai, S., Kajiayama, S., Matsuda, M., Miyawaki, T., Matsumoto, S.,	To evaluate the effect of 5-year follow-up of dietitian-led medical nutrition therapy (eating	Retrospective Cohort Study.	Totals participate (n = 242) in intervention group = 138 with dietitian led	Influence of diet on DM2 Glycemic control

Kajiyama, S., Hashimoto, Y., Ozasa, N., Fukui, M. Japan.	vegetables before carbohydrates) on glycemic control in outpatients with type 2 diabetes (T2DM) at a primary care clinic.		medical nutrition therapy and non-intervention group = 104.	
(4) Kahleova, H., Tonstad, S., Rosmus, J., Fisar, P., Mari, A., Hill, M. & Pelikanova, T. 2016. Czech Republic	To explore the effect of a vegetarian versus conventional diet on the serum levels of persistent organic pollutants (POPs) in patients with T2D	Randomized control method (RCTs)	RCT. Participant. 37 in dietary intervention, Inclusive T2D patient. Completed by 35 of 37 (95%) participants in the VG and 34 of 37 (89%) of participants in the CG. Adherence to the prescribed diet analyzed from the 3-day dietary records was 72.5% in VG and 71.0% in CG	Influence of weight management in Dm2. BMI control
(5) Khazrai YM, Defeudis G, & Pozzilli P. 2014. America	To explore whether a diabetes diet can be identified which promotes controlled blood	Case study (Research & Review)	Total Participants (n=322) Intervention Group= randomly into 3.	influence of weight management in Dm2.

	glucose levels and reduces risks of diabetes.		(322/3) with (1) Low fat diet, (2) low carbohydrates and Mediterranean diet, (3) traditional Mediterranean diet	Medical nutrition therapy and diabetes control management
(6) Monlezun, D. J., Kasprowicz, E., Tosh, K.W., Nix, J., Urday, P., Tice, D., Sarris, L. & Harlan, T.S. 015. Ireland	To establish proof-of-principle for its hands-on Mediterranean diet **(**MD)-based cooking and nutrition curriculum for patients with type 2 diabetes (T2D) medical school-based teaching kitchen.	Randomized control method (RCTs)	27 RCT with T2D.Inclusive GCCM group.	influence of diet in DM2 Nutrition planning Food portion control.
(7) Sami W, Ansari T, Butt NS, Hamid MRA. 2017. Saudi Arabia	To examine numerous studies to explore the relationship of T2DM with different dietary habits/patterns and practices and its complications, dietary habits and	Research review.	Data worldwide Assessment of people with T2D 366million (8.3%) group 20–79 years old) 63 % of T2dm patients were	Influence of diet knowledge in DM 2. Meal timing Metabolic control

	sedentary lifestyle are the major factors for rapidly rising incidence of DM among developing countries.		unaware in India. According to the statistics 97.3male and 93.1 % of T2DM patients in Saudi Arabia were unaware of the importance of monitoring diabetes	
(8) Ravi, S., Kumar, S. & Gopichandran, V. 2018. India.	To assess whether diabetes family support improves diabetes self-management and glycemic control in a typical urban population in India.	A cross-sectional study.	The study involved a total of 200 consecutive patients from the diabetes ou tpatient department who were interviewed.	Influence of support in DM2 DM2 self-management and family support
(9) Polhuis, K. C.M. M., Vaandrager, L., Soedamah-Muthu, S. S.& Koelen, M. A. 2021. UK & Ireland.	To describe the development, structure, and content of this salutogenic in tervention.	randomized controlled trials (RCTs)	The study was conducted in 12 weeks with two phases based on principles of salutogenesis for DM2 patients, healthcare providers and scientists. In	Influence of support in DM2 DM 2 physical and psychosocial support

			Phase 1 (exploration and synthesis) – enable healthy eating every day and Phase 2 (validation and adjustment).	
(10) García-Molina, L., Lewis-Mikhael, A. M., Riquelme-Gallego, B., Cano-Ibáñez, N., Oliveras-López, M. J. & Bueno-Cavanillas, A. 2020. Spain.	To analyze the scientific evidence concerning the role of nutritional intervention in the glycemic control of type 2 diabetes mellitus.	Randomized controlled trials (RCTs)	The data was searched from PubMed, Scopus, Cochrane Library and Web of Science databases. It included dietary **interventions** in the management of patients with **type 2 diabetes mellitus**.	Influence of support in DM2 DM 2 group and multiprofessional support