EFFECTIVENESS OF MEDITERRANEAN DIET PYRAMID ON DIABETIC CONTROL AND CARDIOVASCULAR RISK MODIFICATION AMONG PATIENTS WITH TYPE 2 DIABETES MELLITUS AT A HOSPITAL IN MUSCAT, OMAN

By

AL-AUFI NAJWA SALIM KHALFAN NASSER

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia in Fulfilment of the Requirements for the Degree of Doctor of Philosophy

November 2022

FPSK (p) 2022 48

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

EFFECTIVENESS OF MEDITERRANEAN DIET PYRAMID ON DIABETIC CONTROL AND CARDIOVASCULAR RISK MODIFICATION AMONG PATIENTS WITH TYPE 2 DIABETES MELLITUS AT A HOSPITAL IN MUSCAT, OMAN

By

AL-AUFI NAJWA SALIM KHALFAN NASSER

November 2022

Chairman : Professor Chan Yoke Mun, PhD
Faculty : Medicine and Health Sciences

Adoption of the Mediterranean Diet (MedDiet) has been shown to be effective on glycaemic control and decrease cardiovascular risk among individuals with diabetes mellitus in different populations. However, little compelling evidence is available on the effectiveness of MedDiet among Omanis. The general objective of this study is to determine the effectiveness of the Mediterranean Diet on glycaemic control and cardiovascular risk among type 2 diabetes patients in Muscat, Oman. This wait-list, open-labelled, randomized control trial aimed to assess if the provision of a 6 month MedDiet intervention is effective on cardiovascular risks and diabetic control. A total of 134 patients with Type 2 Diabetes Mellitus (T2DM) from the Nutrition Clinic of National Diabetes and Endocrine Centre at the Royal Hospital, Muscat, Oman was recruited and assigned into standard low-calorie diet control (1200-1500 calorie per day for women and 1500-1800 calories per day for men) (n=73) or MedDiet (n=61) group. Follow-up assessments and data collection were conducted during baseline, three and six months after the intervention. All data was analysed using SPSS version 26, with mixed model ANOVA was used to delineate the effectiveness of Mediterranean Diet intervention as compared to standard low-calorie diet. At baseline, average age of study participants was 44 years old. A higher proportion of them were female (56.3%), married (66.7%), have above primary education (69.4%), working (54.0%) and lower-income (< 800 rials; 50.8%). Total calories, carbohydrates, and fats intake were comparable between the two groups, while participants in the control group had significantly higher protein intake (17.5±4.5g vs. 15.5±3.7, t = 2.660, p = 0.009) compared to intervention group. Trans fat intake was significantly higher in intervention group (2.3±2.4 g vs. 1.3±1.7g, t = -2.501, p=0.014), while cholesterol intake was significantly higher in control group (270.1±160.8mg vs. 197.7±133.7mg, t = 2.726, p =0.007). Approximately three-quarters of the participants had poor adherence to the MedDiet, especially in intervention group (88.1% vs. 62.7%; χ^2 = 10.72, p = 0.001). There was a significant difference in the mean score of the MedDiet between study groups (control: 4.82 ± 2.18

vs. intervention: 3.78 ± 1.40; t =3.217, p =0.002). For the food groups, the cohesion for the usage of olive oil as the main cooking or culinary fat (0.10 ± 0.31 vs. 0.02 ± 0.13; t= 2.120, p = 0.045), commercial sweets or pastries (not homemade) (0.49 ± 0.50 vs. 0.31 ± 0.46; t = 2.173, p=0.032), vegetables (0.33 ± 0.47 vs. 0.08 ± 0.28; t = 3.561, p=0.001) and butter, margarine or cream (0.10 ± 0.31 vs. 0.01 ± 0.13; t= 2.120, p= 0.037) were higher among the control group compared to the intervention group. There were comparable self-perceived to healthy eating between the two groups such as personal and environmental barriers (11.40 ±1.71 vs. 11.42 ± 1.85; χ2= 0.065, p= -0.948), social and environmental barriers (7.70 ±1.24 vs. 8.12 ±1.53; χ2= 1.686, p= -0.094) and level of perceived barrier to healthy eating (Low (<17); 5(7.5) vs. 7(11.9); χ2= 3.689, p = 0.158), Moderate (17 – 22); 60(89.6) vs. 46(78.0), High (> 22); 2(3.0) vs. 6(10.2)). Moreover, the control participants have higher self-efficacy to healthy eating and diabetes management (19.91±2.53 vs. 19.49±2.38; t= 0.953, p= 0.343) compared to the intervention group. About 6% of the study participants have a high perceived barrier to healthy eating while almost 70% have low self-efficacy to healthy eating and diabetes management. There were 26% of the participants had low physical activity and 30% have a risk of dozing off. The control and intervention participants have comparable vigorous physical activity (65.07±143.69 vs. 48.14±139.71; t= 0.669, p = 0.505), moderate physical activity (113.13±106.66 vs. 101.69±111.50; t= 0.588, p= 0.558), walking (740.28±240.82 vs. 678.73±179.48; t = 1.608, p= 0.110) and total intensity of physical activity (918.49±377.93 vs. 828.57±307.63; t= 1.452, p= 0.149). With regards to daytime sleepiness, male participants from the intervention group and female participants from the control group have higher daytime sleepiness. The anthropometry parameters namely weight (108.9±23.6 kg vs. 118.1±23.2 kg; t= -2.195, p = 0.030) and Body Mass Index (41.6±7.9 kg/m^2 vs. 44.6±7.7 kg/m^2; t= -2.182, p= 0.031) were higher among the intervention participants. Dietary phosphorus was inversely associated with HbA1c concentration (p= 0.023) among the study participants, while increased in calcium intake was associated with higher concentration of HbA1c (p=0.007). Higher score in barriers to healthy eating and self-efficacy were associated with higher concentration of HbA1c (p=0.008 vs. p < 0.001). Higher fasting blood glucose and LDL cholesterol were also associated with increased HbA1c among the study participants (p= 0.003 vs. p= 0.001). There was no significant different in the mean or distribution of the metabolite traits between the intervention and control participants. On the other hand, there were 80-90% of the participants had sub-optimal glycaemic control, hypercholesterolemia, hypertriglyceridemia, and elevated low-density lipoprotein, with 77% of them had metabolic syndrome. Obesity was prevalent with about 65% were either severely or morbidly obese with 80% had central obesity. After 6 months intervention, adherence to MedDiet had increased significantly over time in the intervention group, with mean changes were significantly higher between baseline and 6 months follow-up. Using repeated measure ANOVA, MedDiet intervention has small to moderate but significant effects towards reducing metabolic profiles (additional reduction of 4.88%, 13.28%, 14.89% and 23.18% for total cholesterol, HbA1c, triglycerides and fasting blood glucose, respectively) and anthropometrics parameters (additional reduction of 12.07%, 12.01% and 4.77% for body weight, body mass index and waist circumference, respectively). In addition, there was significant increase in physical activity intensity but lesser daytime sleepiness in the intervention participants as compared to their control counterparts. The current study revealed that carefully plan nutritional education emphasizing MedDiet was effective and superseded the conventional nutrition counselling in the improvement of metabolic control (glycaemic control and reduction of cardiovascular risk), dietary intake, psychosocial factors, daytime sleepiness, physical activity of T2DM patients. The current educational module can be incorporated in the existing diabetic control program for optimising metabolic control of T2DM patients from non-Mediterranean countries or populations like Oman.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

KEBERKESANAN PIRAMID DIET MEDITERRANEAN TERHADAP KAWALAN DIABETIS DAN PENGUBAHSUAIAN RISIKO KARDIOVASKULAR DALAM KALANGAN PESAKIT DIABETES MELLITUS JENIS 2 DI HOSPITAL DI MUSCAT, OMAN

Oleh

AL-AUFI NAJWA SALIM KHALFAN NASSER

November 2022

Pengerusi : Profesor Chan Yoke Mun, PhD
Fakulti : Perubatan dan Sains Kesihatan

Penggunaan Diet Mediterranean (MedDiet) telah terbukti berkesan terhadap kawalan glisemik dan meningkatkan risiko kardiovaskular dalam kalangan individu yang menghidap diabetes mellitus dalam kalangan populasi yang berbeza. Walau bagaimanapun, bukti keberkesanan MedDiet adalah kekurangan dalam kalangan rakyat Oman. Kajian ini merupakan kajian kawalan rawak senarai tunggu, berlabel terbuka bertujuan untuk menilai keberkesanan MedDiet terhadap risiko kardiovaskular dan kawalan diabetes, dengan perubahan faktor psikososial, kualiti tidur, aktiviti fizikal dan tingkah laku pemakanan sebagai hasil sekunder. Seramai 134 pesakit diabetes mellitus (T2DM) dari Klinik Pemakanan Pusat Diabetes dan Endokrin Kebangsaan di Royal Hospital, Muscat, Oman telah direkruit dan dibahagikan sebagai kumpulan kawalan diet rendah kalori (1200 – 1500 Kcal setiap hari) (n=73) atau kumpulan MedDiet (n=61). Pengumpulan data telah dijalankan untuk fasa awalan, dengan penilaian susulan dilakukan tiga dan enam bulan selepas intervensi. Pada peringkat kajian awalan, purata umur subjek kajian ialah 44 tahun. Majoriti subjek terdiri daripada wanita (56.3%), berkahwin (66.7%), mempunyai pendidikan rendah atas (69.4%), bekerja (54.0%) dan berpendapatan rendah (< 800 rial; 50.8%). Terdapat perbezaan yang signifikan dalam pendapatan isi rumah bulanan antara kumpulan intervensi dan kawalan (χ^2 = 9.424, p = 0.024). Majoriti subjek tidak merokok (84.9%) atau mengambil alkohol (93.7%). Jumlah pengambilan kalori, karbohidrat dan lemak adalah setanding antara kedua-dua kumpulan, manakala subjek dalam kumpulan kawalan mempunyai pengambilan protein yang jauh lebih tinggi (17.5±4.5 g vs. 15.5±3.7g, t = 2.660, p = 0.009). Pengambilan lemak trans (2.3±2.4 g vs. 1.3±1.7g, t = -2.501, p=0.014) adalah lebih tinggi dalam kumpulan intervensi berbanding kumpulan kawalan. Kira-kira tiga perempat daripada subjek mempunyai pematuhan yang rendah kepada MedDiet, terutamanya dalam kumpulan intervensi (88.1% vs. 62.7%; χ^2 = 10.72, p = 0.001). Terdapat perbezaan yang signifikan dalam skor min MedDiet antara kumpulan kajian (kawalan: 4.82 ± 2.18; intervensi: 3.78 ± 1.40; t =3.217, p =0.002). Dari aspek kumpulan makanan, kohesi

penggunaan minyak zaitun sebagai masakan utama atau lemak masakan (0.10 ± 0.31 vs. 0.02 ± 0.13; t= 2.120, p = 0.045), gula-gula atau pastri komersial (bukan buatan sendiri) (0.49 ± 0.50 lawan 0.31 ± 0.46; t = 2.173, p=0.032), sayur-sayuran (0.33 ± 0.47 lawan 0.08 ± 0.28; t = 3.561, p=0.001) dan mentega, marjerin atau krim (0.10 ± 0.31 lawan 0.01 ± 0.13; t= 2.120, p= 0.037) adalah lebih tinggi dalam kalangan subjek kawalan berbanding kumpulan intervensi. Terdapat persepsi diri yang setanding dengan pemakanan sihat antara kedua-dua kumpulan seperti halangan peribadi dan persekitaran (11.40 ±1.71 vs. 11.42 ± 1.85; χ^2= 0.065, p= -0.948), halangan sosial dan persekitaran (7.70 ±1.24 vs. 8.70 ±1.24 vs. ±1.53; χ^2= 1.686, p= -0.094) dan tahap halangan terhadap pemakanan sihat (Rendah (<17); 5(7.5) berbanding 7(11.9); χ^2= 3.689, p = 0.158), Sederhana (17 – 22; 60(89.6) berbanding 46(78.0), Tinggi (> 22); 2(3.0) berbanding 6(10.2)). Selain itu, subjek kawalan mempunyai efikasi kendiri yang lebih tinggi terhadap pemakanan sihat dan pengurusan diabetes (19.91±2.53 vs. 19.49 ±2.38; t= 0.953, p= 0.343) berbanding kumpulan intervensi. Kira-kira 6% daripada subjek kajian mempunyai halangan yang tinggi terhadap pemakanan sihat manakala hampir 70% mempunyai efikasi kendiri yang rendah untuk pemakanan sihat dan pengurusan diabetes. Terdapat 26% daripada subjek mempunyai aktiviti fizikal yang rendah dan 30% mempunyai risiko mengantuk. Berkenaan dengan mengantuk pada siang hari, subjek lelaki dari kumpulan intervensi dan subjek wanita dari kumpulan kawalan mempunyai rasa mengantuk pada siang hari yang lebih tinggi. Parameter antropometri iaitu berat (108.9±23.6 kg lawan 118.1±23.2 kg; t= -2.195, p = 0.030) dan Indeks Jisim Badan (41.6±7.9 kg/m2 lawan 44.6±7.7 kg/m2; t= -2.182, p= 0.031) adalah lebih tinggi dalam kalangan subjek intervensi. Pengambilan fosforus dikaitkan secara songsang dengan kepekatan HbA1c (p= 0.023) dalam kalangan subjek kajian, manakala peningkatan dalam pengambilan kalsium dikaitkan dengan kepekatan HbA1c yang lebih tinggi (p=0.007). Skor yang lebih tinggi dalam halangan kepada pemakanan sihat dan keberkesanan diri dikaitkan dengan kepekatan HbA1c yang lebih tinggi (p=0.008 berbanding p < 0.001). Glukosa darah puasa yang lebih tinggi dan kolesterol LDL juga dikaitkan dengan peningkatan HbA1c dalam kalangan subjek kajian (p= 0.003 vs. p= 0.001). Tidak terdapat perbezaan yang signifikan dalam min atau taburan ciri-ciri metabolit antara subjek intervensi dan kawalan. Secara keseluruhan, terdapat 80-90% daripada subjek mempunyai kawalan glisemik yang sub-optimum, hiperkolesterolemia, hipertrigliseridemia, dan lipoprotein berketumpatan rendah tinggi, dengan 77% daripada mereka mempunyai sindrom metabolik. Prevalensi obesiti adalah tinggi di mana kira-kira 65% subjek mempunyai obesiti teruk atau morbid dengan 80% mempunyai obesiti berpusat Selepas intervensi selama 6 bulan, pematuhan kepada MedDiet telah meningkat dengan ketara dari semasa ke semasa dalam kumpulan intervensi, dengan perubahan min adalah lebih tinggi antara awalan dan susulan 6 bulan. Menggunakan ukuran ANOVA berulang, intervensi MedDiet mempunyai kesan kecil hingga sederhana tetapi ketara ke arah mengurangkan profil metabolik (pengurangan yang lebih tinggi sebanyak 4.88%, 13.28%, 14.89% dan 23.18% untuk jumlah kolesterol, HbA1c, trigliserida dan glukosa darah berpuasa, masing-masing) dan parameter antropometrik (pengurangan tambahan sebanyak 12.07%, 12.01% dan 4.77% masing-masing untuk berat badan, indeks jisim badan dan lilitan pinggang). Di samping itu, terdapat peningkatan ketara dalam intensiti aktiviti fizikal tetapi kurang mengantuk pada siang hari dalam subjek intervensi berbanding dengan rakan kawalan mereka. Kajian semasa membuktikan bahawa merancang pendidikan pemakanan yang menekankan MedDiet adalah lebih berkesan berbanding kaunseling pemakanan konvensional dalam kawalan metabolik (kawalan glisemik dan pengurangan risiko kardiovaskular), pengambilan diet, faktor psikososial, mengantuk siang hari, aktiviti fizikal pesakit T2DM. Modul pendidikan semasa boleh digabungkan dalam program kawalan diabetes sedia ada untuk mengoptimumkan kawalan metabolik pesakit T2DM dari negara atau populasi bukan Mediterrenean seperti Oman.

ACKNOWLEDGEMENTS

In the name of Allah, the Most Gracious, the Most Merciful.

All gratifications are referred to Allah

Firstly, I would like to acknowdedge and give my warmest grtitude to my main supervisor, Professor Dr. Chan Yoke Mun for the continuous support, patience and assistance throughout my PhD study. Her guidance helped me to accomplish such a challenging task. Besides my supervisor, I would like to thanks my co supervisors, Associate Professor Dr. Chin Yit Siew, Associate Professor Dr. Barakatun Nisak Mohd Yusof, Dr. Norliza Ahmed and Professor Dr. Mostafa Waly for their insights, guidance and encouragement that had given me impetus to complete this thesis on time. Special thanks to Dr.Noor Al-Busaidi for her valuable advice and guidance in data collection.

Besides, my deepest appreciations go to all dietitians and nurses at National Diabetes and Endocrine Centre at the Royal Hospital, Muscat, Oman. My sincere thanks also go to all participants for their willingness to sacrifice their time and co-operation through the study period.

Finally, and most importantly, I would like to thank my parents, my brother and my sisters for their endless care, support and encouragement throughout my life and this study. Thank you very much, for I could not have done it without all of you!.

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

Chan Yoke Mun, PhD
Professor
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
(Chairman)

Barakatun Nisak binti Mohd Yusof, PhD
Professor
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
(Member)

Chin Yit Siew, PhD
Associate Professor
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
(Member)

Norliza binti Ahmad, MD, M. Community Health, PhD
Senior Medical Lecturer
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
(Member)

Mostafa Waly, PhD
Professor
College of Agricultural and Marine Sciences
Sultan Qaboos University
Oman
(Member)

ZALILAH MOHD SHARIFF, PhD
Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 8 June 2023

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ACLS	Aerobics centre longitudinal study
ADA	American Diabetes Association
BMI	Body mass index
CARDIA	Coronary artery risk development in young adults
CDC	Center of diabetes control
CHD	Coronary heart disease
CHO	Carbohydrate
CI	Confidence intervals
CRP	C-reactive protein
CVD	Cardiovascular diseases
DASH	Dietary Approaches to Stop Hypertension
DBP	Diastolic blood pressure
DCCT	Diabetes control complications trial
DM	Diabetes mellitus
EMR	Eastern mediterranean region
EPIC	European prospective investigation into cancer and nutrition
ESS	Epworth sleepiness scale
EVOO	Extra virgin olive oil
FBG	Fasting blood glucose
FFQ	Food frequency questionnaire
FHSOC	Framingham heart study offspring cohort
GABA	Gamma-aminobutyric acid
GCC	Gulf cooperation council
GDM	Gestational diabetes mellitus
HBM	Health belief model

HDL	High density lipoprotein cholesterol
IDF	International diabetes federation
IPAQ	International physical activity questionnaire
IR	Insulin resistance
LDL	Low density lipoprotein cholesterol
MedDiet	Mediterranean diet
MENA	Middle East and North Africa
MI	Myocardial infarction
MOH	Ministry of health
MUFA	Monounsaturated fatty acids
NCDs	Non-communicable diseases
NDEC	Natioanl Diabetes and Endocrine Centre
NDNS	National diet and nutrition survey
PA	Physical activity
PCC	Patient-centred care
PREDIMED	PREvención con DIeta MEDiterránea
PUFA	Polyunsaturated fatty acids
RBG	Random blood glucose
RCT	Randomized controlled trial
RDA	Recommended Dietary Allowance
RLS	Restless leg syndrome
RNI	Recommended nutrient intake
SBP	Systolic blood pressure
SD	Standard deviation
SED	Self-efficacy for diabetes
SFA	Saturated fatty acids
T0	Baseline

T1	Post intervention 1
T2	Post intervention 2
T2DM	Type 2 diabetes mellitus
TC	Total cholesterol
TG	Triglyceride
TTM	The transtheoretical model
UKPDS	UK prospective diabetes study
WC	Waist circumference
WHO	World health organization
WHR	Waist-to-hip ratio
WHtR	Waist-to-height ratio

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

1.1.1 Prevalence of Diabetes Worldwide

Diabetes mellitus consider as a metabolic disorder primarily characterized by hyperglycemia, which caused by either a disturbed insulin secretion (Type 1 diabetes mellitus) or insulin insensitivity (Type 2 diabetes mellitus) or both (WHO, 2019; American Diabetes Association, 2020). Type 2 diabetes mellitus (T2DM) is the most common type of diabetes, accounting for around 90% of all diabetes worldwide (International Diabetes Federations (IDF), 2020). It is confirmed as one of the fastest growing global health emergencies of the 21st century (IDF, 2020). Globally, the estimated prevalence of diabetes (in people aged 20–79 years has affected 463 million (9.3%) people as of 2019. Without sufficient action to address the pandemic, it is predicted a total of 578 million people, representing 10.2% of the population will have diabetes by 2030 and further jump to a staggering 700 million (10.9% of the population) by 2045 (IDF, 2020). Diabetes Mellitus has a large worldwide economic impact, with an expected annual expenditure of USD 760 billion in 2019 and a predicted increase of 11.2% to USD 845 billion by 2045 (IDF, 2019).

1.1.2 Prevalence of Diabetes in Gulf Countries

According to recent literature, the prevalence of type 2 diabetes in the Gulf Cooperation Council (GCC) is high, has raised significantly in the last two decades, and is anticipated to rise by 96.5 percent by 2045 (Al Slamah et al., 2017; Morgan et al., 2019). Like other developing countries, Oman has a high incidence of non-communicable diseases (NCDs), with increasing evidence that lifestyle-related NCDs have emerged as new health challenge to the Omani (Al Riyami 2010; Al Riyami & Afifi, 2003; Al-Shookri et al., 2011; Asfour et al., 1995; Ganguly et al., 2009; Hassab, Jaffer & Hallaj, 1995; Khatib 2004). Align with this, there has been a substantial increase in the prevalence of T2DM over the years, attributed to the epidemiological transition and socioeconomic development (Al-Lawati et al., 2015; Al-Riyami et al., 2012). More recently, the prevalence of pre diabetes and diabetes among adults aged more than 18 years old were 15.7% and 11.8%, respectively (Al Mawali et al., 2021). Generally, the prevalence of T2DM in Oman as well as in other Eastern Mediterranean (EMR) region is higher than the prevalence reported in other Asian countries (Akter et al., 2014; Pham & Egglesten, 2016; Tripathy et al., 2017; WHO, 2020). The World Health Organization (WHO) has designated Oman as a country with low child and adult mortality rates (crude death rate: 2.4 per 1000). Particularly, diabetes mellitus is the sixth major cause of premature death and the fifth leading source of disability-adjusted life years lost in Oman (Knudsen, 2019) which have been identified as the fastest growing health crisis in Oman (Al Mawali et al., 2021). The prevalence of type 2 diabetes in the Guld Cooperation Council (GCC) is high with a considerate increase in the past two decades and is foreseen to increase by 96.5 % by 2045 (Al Slamah et al., 2017; Morgan et al., 2019). The reported prevalence of diabetes among the Omanis is 15.7 % accompanied with other chronic diseases, resulting death of 187.75 people per 100 thousand in Oman each year (Al- Mawali et al., 2021).

In Oman, the majority of diabetic patients are poorly controlled and are prone to complications, putting the country under greater financial strain (Al Mawali et al., 2021). T2DM and cardiovascular diseases (CVD) had been identified earlier as a main and increasing workload for clinicians in Omani clinics and hospitals (Al-Lawati et al., 2015). Without concerted action, Oman is expected to experience substantial increase in its prevalence and associated macrovascular and microvascular complications, as such give serious impact on socioeconomic, health and psychosocial to the people and nation. The WHO has identified "best buys" with lifestyle interventions are important to mitigate NCDs including T2DM. The Omani Ministry of Health (MOH) recommended the initiation of patient- centred care (PCC) model as a model of care delivery into its health care system to address the chronic conditions , implying nurses as the primary care team to deliver health promotion and patient education (Ministry of Health, 2015).

1.1.3 Risk factor of Diabetes

The most common factors of diabetes are metabolic and behavioural risk factors and can be largely preventable by several available means. Among all, genetic susceptibility and environmental influences are factors responsible for the development of T2DM and its complications (Asif, 2014). Physical inactivity and poor diet quality however make up the main basis of the environmental factors which are largely modifiable. research supports the effectiveness of lifestyle interventions across community and clinical research and delivery formats (groups, personals, or technology-based) and implementers. Studies conducted in Oman revealed that, there were many factors linking or contributing to the impending prevalence of type 2 diabetes, including the high prevalence of sedentary lifestyles, obesity and physical inactivity (Al-Haifi et al., 2013; Al-Lawati & Jousilahti, 2004; Al Riyami et al., 2012; Mabry, Owen & Eakin, 2014), which are not new to researchers.

1.1.4 Sleep Quality vs. Diabetes

Sleep problems are defined as difficulties falling or staying asleep, as well as sleep that is not restful. Sleep disturbances appear to be frequent in society, according to epidemiological studies. Sleep disturbances can have serious implications, such as weight-related problems, hypertension, dyslipidaemia, type 2 diabetes, metabolic syndrome and cardiovascular disease. Sleep difficulties are found in around 50–70% of diabetes patients, negatively affecting their lives by compromising school or business performance, marriage, and other aspects of life (Keskin et al., 2015; Zhu et al., 2017). Sleep disturbance, especially impaired sleep quality, could potentially influence glycaemic control in T2DM patients (Zhu et al., 2017). Sleep disturbance is a symptom that is defined by poor sleep quality and/or atypical sleep length, among other things.

Diabetes-related physiological changes and psychological well-being are two precursors. Daytime functioning, glycaemic management, and quality of life can all be impaired by sleep disruption (Zhu et al., 2018). Poor sleep and insomnia has been associated with decrease in gamma-aminobutyric acid (GABA). A decrease level of GABA is usually observed in depression patients. Moreover, it has been demonstrated to prevent the apoptosis of rodent beta cells. Type 1 DM has been associated with glutamate decarboxylase, the key enzyme (GAD) involved in the manufacture of GABA. At low level, GABA may play a role in the quality of sleep experienced by the diabetics. On the other hand, orexins have been implicated in glucose metabolism and linked to nutrition, arousal, sleep, and energy balance. Moreover, Nocturnal hypoglycemia can lead to sleep disruption and can be regarded as one of the many factors leading to poor sleep quality among diabetics. Studies showed diabetic patients with Restless Leg Syndrome (RLS) may also suffer from peripheral neuropathy. Diabetic patients who suffer from RLS are more likely to report worse sleep quality, have longer sleep latency and worse sleep efficiency, and experience more daytime dysfunction compared with diabetic controls without RLS (Allen et al., 2013; Surani et al., 2015; Winkelman et al., 2014).

1.1.5 Psychological factors and Diabetes

Several psychological factors were associated with glycaemic control among diabetes patients. Studies showed that perceived barriers have been associated with decreased medication use or adherence as well as low physical activities, which have been vastly linked with poor glycaemic control among T2DM patients (Adu et al., 2019; Sina, Graffy & Simmons, 2018). Beside self-care behaviours, lifestyle behaviours such as physical activity was found as one of modifiable behaviours which was consistently found to reduce the risk of diabetes development. Some studies have tried to assess the relationship between physical activity and diabetes management, yet the results are inconsistent (Baskerville et al., 2017; Rachmah et al., 2019).

Type 2 diabetes mellitus is a leading cause of microvascular issues such as retinopathy and macrovascular issues including cerebrovascular disease and coronary artery disease. People living with T2DM have higher rate of hospitalisation (Donnan et al., 2020; Harding et al., 2020; Pournaras et al., 2017) and high incidence of morbidity and mortality (IDF, 2020). In 2019, over four million people aged 20–79 years were estimated to die from diabetes-related causes (Pournaras et al., 2017). With approximately 75% are of working age (IDF, 2020), diabetes mellitus imposes a high economic effect on health systems, countries and, when healthcare needs to be funded ‘out-of-pocket’, for individuals with diabetes and their families (Care, 2017; Harding et al., 2020; Peter et al., 2017; Yang et al., 2012).

The majority of uncontrolled cases, which account for more than two-thirds of cases with elevated blood glucose, are extremely alarming. This pool of uncontrolled diabetes mellitus cases would become more prone to complications, putting a greater financial pressure on the country. When only the Omani national population treated by free primary healthcare was examined, approximately half of those taking medication were found to have a regulated blood glucose condition. This indicates that only 17% patients who received treatment under health system had their blood glucose levels under control, which is a concerning figure (Al-Mawali et al., 2021). To address unsafe behaviours and subsequent health-related interventions, the challenges of health promotion must be addressed as part of Oman's Health Vision 2050 (Al-Hinai et al., 2020). Further research into the underlying issues is critical (Al-Mawali et al., 2017).

1.1.6 Mediterranean Diet

Recently, research in health and nutrition has begun to focus on dietary pattern approaches instead of the evaluation of one nutrient or food (Koloverou et al., 2014; Freeland-Graves & Nitzke., 2013; Dinu et al., 2018; Koloverou et al., 2014; Shen et al., 2015; Esposito et al., 2014) in militate NCDs including diabetes mellitus. Based on this holistic approach, many dietary patterns have been identified and some play a significant role in the prevention and/or management of chronic diseases such as blood pressure, coronary heart disease and cancer. One of the most studied patterns is the Mediterranean diet, first characterized in the late 1970s (Keys et al., 1986).

The traditional Mediterranean diet describes the traditional dietary habits of people living around the Mediterranean basin, specifically in the olive tree growing regions in a time before globalization expanded also to the food culture. Mediterranean Diet (MedDIET) is characterized by abundant plant foods, mainly fruit, vegetables, nuts, seeds, bread, beans, cereals and legumes, in addition to include olive oil as a main source of healthy fat and highlight the use of spices and herbs. The diet also consists of a moderate amount intake of dairy products such as yoghurt and cheese, low to moderate amounts of fish and low amounts intake of red meat and poultry (Kafatos et al., 2000, Willett et al., 1995; Bach-Faig et al., 2011; Estruch et al., 2018; Raddetto, 2012; Trichopoulou et al., 2003 and Davis et al., 2015). In general, the Mediterranean Diet (MedDiet) is characterized by high amounts of antioxidants and fibre, a balanced ratio of (n-6):(n-3) essential fatty acids and rich in monounsaturated fatty acids (Simopoulos, 2001). The MedDiet has been shown to successfully mitigate against CVD risk factors such as hypertension, hypercholesterolemia, obesity and metabolic syndrome (Hosseini-Esfahani et al., 2010, Rossi et al., 2013, Salas-Salvado et al., 2014; Tobias et al., 2012).

1.2 Proplem Statement

The Sultanate of Oman is located on the southeast corner of the Arabian Peninsula is a high-income oil-producing country. In the last few decades, there has been rapid socioeconomic development which has resulted in epidemiological and demographic transitions, with alarming rise in the incidence of NCDs including T2DM and CVD. The later had imposed a great challenge on the health care system in Oman and signify the need for appropriate lifestyle intervention (Ministry of Health of Oman, 2016; Khan., 2012). Estimating diabetes prevalence and identifying high-risk groups is critical for monitoring, policy creation, and clinical intervention. In the Sultanate of Oman, there is currently insufficient, up-to-date information on the prevalence of type 2 diabetes and its risk factors. Most of the studies focused on general community yet studies in Oman were restricted, and they did not accurately represent all of the risk factors and their correlations with diabetes in the Oman population (Al-Lawati et al., 2015; Al-Lawati, 2017; Majeed et al., 2014). There is a need for a clinical-setting base study for a focused and personalised risk assessment and intervention.

Dietary management is often recommended as the first-line treatment of type 2 diabetes, prior to, or in parallel with initiation of pharmacological therapy (Johensen et al., 2017). Lifestyle interventions on T2DM have also produced favourable outcomes (Asaad et al., 2016; Johansen et al., 2017; Look AHEAD Research Group, 2007; Pot et al., 2018; Ried-Larsen et al., 2017; Gong et al., 2018). However, there have been conflicting results which may be explained by reliance on advice-based exercise interventions as opposed to supervision of exercise (Johensen et al., 2017) as well as poor adherence to dietary recommendations (Webb & Byrd-Bredbenner, 2015) and unavailability of healthy food choices (Asaad et al., 2016). Despite national dietary guidelines are available as early as 40 years ago, population dietary change has been slow, with many still fall short of current food-based dietary recommendations and poor adherence to dietary guidelines are evident. The Omani Food groups are categorised of all the food items consumed by the locals, Omanis which are further classified unto groups based to their content of energy and nutrients. The Omani dietary guidelines are composed of six food groups namely whole grains and potatoes, fruits, vegetables, meats and alternatives, legumes, milk and dairy products. Moreover, the Omani dietary Guidelines encourages the consumption of a variety of food items from the six food groups on a daily basis in the recommended proportions that are consistent with the food guide for a healthy lifestyle and nutrition intake. Whole grains cereal and potatoes with their skin, 3 -5 servings of vegetables daily, 2-4 servings of fruits daily, fish, poultry, eggs or lean meat, 1 serving of legumes daily, milk or dairy products daily, limited intake of fat and wise choice of snacks consumed daily and be active, exercise regularly and drink plenty of water (The Omani Guide to Healthy Eating, 2009).

This is partially attributed to the difficulties of translating present dietary recommendations into food-based public health advice (Mozaffarian, 2019; Webb et al., 2015) and lacks of certain universally consistent recommendation across countries (Herforth et al., 2019). Adherence is further complicated with the expectation of certain level of health literacy such as calculation of calories and label reading among the socioeconomic deprived communities. Dietary guidelines which focus on dietary pattern rather than individual nutrient recommendations could help avoid confusion and avoid inadvertent increases in one nutrient of concern at the expense of another (Mozaffarian, 2019; Herforth et al., 2019; Gao et al., 2021).

Recent meta-analysis and systematic review reported that following the Mediterranean diet was linked with a 19-23% decreased risk of developing diabetes (Koloverou et al., 2014; Schwingshack et al., 2014). However, several cross-sectional and prospective epidemiologic studies suggested an inverse association between consumption of the Mediterranean diet and risk of metabolic syndrome (Panagiotakos et al. 2004; Babio et al., 2009; Viscogliosi et al., 2013; Tortosa et al., 2007; Rumawas et al., 2009; Kesse-Guyot et al., 2013). The majority of available studies were conducted among non-diabetics (Kesse-Guyot et al., 2013; Panagiotakos et al., 2004; Rumawas et al., 2009; Viscogliosi et al., 2013), with inconclusive evidence on the effect of the Mediterranean diet in reducing risk of cardiovascular among diabetics. As cardiovascular disease is responsible for approximately one-third of all mortality among diabetics (Fuller et al., 2001), reducing the risk of cardiovascular among diabetics is potentially important for lowering the risk of CVD. Studies in non-Mediterranean countries such as Australia (Kouris-Blazos et al., 1999), Iran (Veissi et al., 2016) and US (Mitrou et al., 2007, Yang et al., 2014) and other countries (Martínez-González et al.,2015; Huo et al., 2015; Ben-Yacov et al., 2021; Mattei et al., 2019; Sleiman, Al-Badri & Azar, 2015; Milenkovic et al. 2021; Itsiopoulos et al. 2011) had shown that Mediterranean diet worked. This however has not been confirmed among Oman population, whom has experience tremendous nutritional transition including dietary intake, with growing evidence that diet of Omanis are high fat but low in fruits and vegetables (Al-Lawati et al., 2015; Al-Riyami et al., 2012).

Growing evidence from intervention studies on MedDiet demonstrated generally a good adherence with Mediterranean diet among the patients. The flexibility of MedDiet with the emphasize of encouraging positive behaviour change and improving dietary quality through displacement of discretionary items with healthy nutrient-dense foods instead of prohibiting of certain goods allow better adherence on MedDiet (Opie et al., 2018). As such, it is worth to investigate and delineate whether a universal-recognised, flexible and workable dietary pattern, namely Mediterranean Diet can improve the glycaemic control and other prominent complications among T2DM patients in Oman.

The prevalence of sleep disturbance is rising at an alarming rate, particularly among T2DM patients. According to reports, 39.4% and 55.0% of them have short sleep duration (6.5 hours per night) and poor sleep quality, respectively. Sleep disturbance and glucose regulation appear to form a cycle via multiple pathophysiological pathways, according to evidence. Sleep disruption is linked to an increased risk of T2DM. Despite growing concern about the effects of sleep disruption on health, few studies have examined the relationships between sleep disruption and diabetes-related health outcomes (Keskin et al., 2015; Zhu et al., 2017; Zhu et al., 2018), however, intervening sleep quality and its effect on glycaemic control in people with T2DM is still scattered.

Perceived barrier and low self-efficacy were found inversely associated with self-care behaviour and promote non-adherence to diabetes management procedures. However, their influence on glycaemic control is under-explored (Adu et al., 2019; Sina, Graffy & Simmons, 2018). Similarly, lifestyle behaviours especially physical activity, was previously assessed based on randomised controlled trial, but the effectiveness of counselling and education intervention on physical activities which predicted to enhance changes in lifestyle behaviours are yet to be assessed (Baskerville et al., 2017; Rachmah et al., 2019).

To date, there is a paucity of data available on how the Mediterranean diet may augment glycaemic control and cardiovascular risk in the Omanis, especially among T2DM patients. The aim of this study was therefore to assess the effects of a Mediterranean diet on glycaemic control and risk of cardiovascular among T2DM patients.

1.3 Significance of the Study

With growing literature that dietary pattern works better than single nutrient approach in NCDs, the findings of this study provided scientific evidence whether dietary pattern approach works for Omani. There were very few published studies on the effects of the Mediterranean diet and its effect on the risk of cardiovascular among T2DM in Arab countries, with no studies are currently being conducted in Middle East countries. Effectiveness of Mediterranean Diet is more profound in Mediterranean countries, with evidence is growing in non-Mediterranean countries (Kouris-Blazos et al., 1999, Veissi et al., 2016, Mitrou et al., 2007, Yang et al., 2014; Martínez-González et al.,2015; Huo et al., 2015; Ben-Yacov et al., 2021; Mattei et al., 2019; Sleiman, Al-Badri & Azar, 2015; Milenkovic et al. 2021; Itsiopoulos et al. 2011). It is expected this study can further inform the scientific communities and policy makers on the effectiveness of Mediterranean Diet in Oman.

Omani Guide to Healthy Eating and Diabetes Mellitus Management Guidelines were available in Oman since 2009 and 2015, respectively (Department of Nutrition, Ministry of Health Oman, 2009; Ministry of Health Sultanate of Oman, 2015). However, the incidences of Type 2 Diabetes Mellitus are increasing in an alarming rate, with poor glycaemic control was evidence among T2DM. This signifies the need for other dietary approach. Findings of this study served as scientific resource to inform the Omani Guide to Healthy Eating according to dietary pattern.

Last but not least, the current study can provide baseline data for future studies which could further explore the effects of the Mediterranean diet on glycaemic control and cardiovascular risk among Type 2 diabetic patients.

1.4 Study Objectives

1.4.1 General Objective

To determine the effectiveness of Mediterranean Diet on glycaemic control and cardiovascular risk among type 2 diabetes patients in Muscat, Oman.

1.4.2 Specific Objectives

1. To determine the following characteristics of the patients with Type 2 Diabetes Mellitus at baseline:

   a. Sociodemographic characteristics (age, education level, sex, marital status, income)

b. Clinical factors (presence of disease, duration of illness, medication)

c. Dietary intake (macronutrients and micronutrients) and adherence to Mediterranean Diet

d. Lifestyle characteristics (smoking, alcohol consumption, physical activity level, daytime sleepiness)

e. Anthropometric measurements (weight, height, BMI, waist circumference)

f. Glycaemic control parameters (fasting plasma glucose, HbA1c)

g. Risk of cardiovascular (systolic and diastolic blood pressure, high density lipoprotein cholesterol, low density lipoprotein cholesterol, ratio of total cholesterol to high density lipoprotein cholesterol, and triglycerides level).

2. To compare the mean differences in Glycaemic control, risk of cardiovascular, dietary intake, physical activity, daytime sleepiness, anthropometric measurements, within and between control and intervention groups at three months (post-intervention 1) and six months (post-intervention 2) after intervention.

1.5 Research Hypotheses

H1. There are significant mean differences between control and intervention groups in the following variables after 3- and 6-months intervention (glycaemic control parameters, risk of cardiovascular, dietary intake, physical activity, daytime sleepiness, anthropometric measurements).

H2. The Mediterranean Diet is significantly associated in improving glycaemic control and reducing risk of cardiovascular among T2DM patients.

1.6 Conceptual Framework

As shown in Figure 1.1, the study aimed to determine the effectiveness of Mediterranean Det on glycaemic control and cardiovascular risk among type 2 diabetes patients in Omani adults. Adherence to Mediterranean diet was associated with significant improvements in health status, with reduced risk of mortality, metabolic syndrome, diabetes and chronic disease. Earlier studies showed Mediterranean diet can improve risk of metabolic syndrome and may prevent or decrease the risk of metabolic syndrome among individuals with T2DM, which has significant impact on socioeconomic and health aspects of an individual.

In this study, a nutritional education program based on the concept of Mediterranean diet was developed. The Health Belief Model (HBM) is a universal recognised theoretical framework to guide the health education intervention and to improve the intervention efficacy. The focus of the intervention was to create awareness among participants and to help them develop an accurate perception of their own risk. Healthy eating is important in preventing diabetes-related complications and participants were reassured that healthy eating is achievable by adopting the Mediterranean diet. The Health Belief Model in this study assesses different components, firstly the perceived severity which indicates the belief of the participants that type 2 diabetes would have serious consequences, followed by perceived susceptibility highlighting that the participants perceived that they are likely to suffer from the type 2 disease. The modifying factors of this study were the demographic factors and social psychological variables. The cues to action was the intervention part which implies the intervention at baseline to follow-ups. Their likelihood of taking action was assessed during the follow-ups to determine the effectiveness of the intervention.

In this study, it is hope to delineate whether the effectiveness of the universal recognised Mediterranean Diet on glycaemic and cardiovascular risk factors which was shown in Mediterranean populations can be replicated in non-Mediterranean population. The effectiveness of the intervention was examined through the changes in surrogate measure of glycaemic control (HbA1c), and cardiovascular risk factors (systolic blood pressure, high density lipoprotein cholesterol HDL, low density lipoprotein cholesterol LDL, ratio of total cholesterol to high density lipoprotein cholesterol, triglyceride level) after a 6-month intervention. Secondary outcomes of the intervention were psychosocial factors, dietary behaviours and daytime sleepiness.

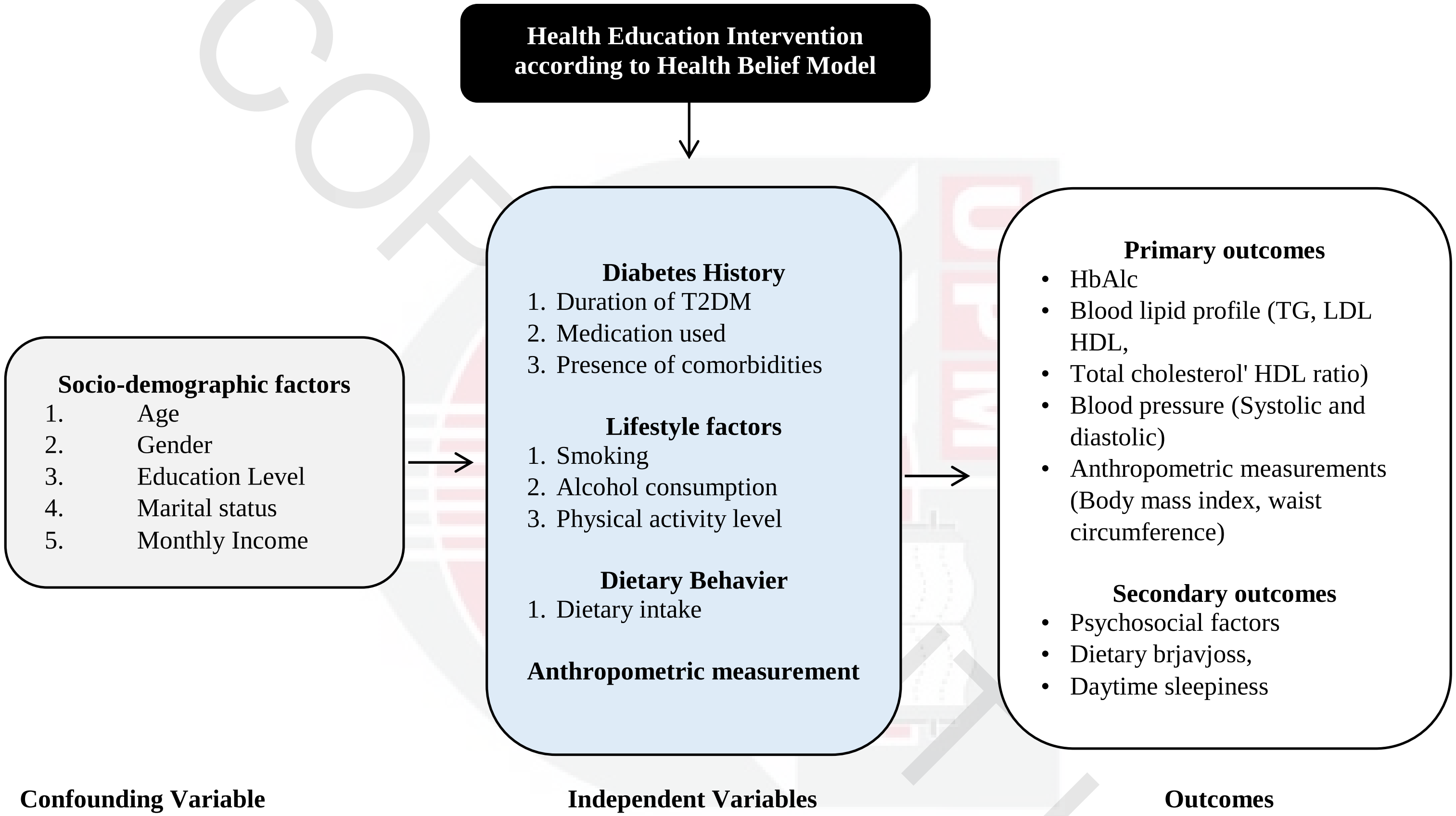

Figure 1.1: Conceptual Framework

REFERENCES

ADA. (1992). Screening for diabetes. Diabetes Care, 15(2), 7-9.

ADA. (2010). Diagnosis and classification of diabetes mellitus. Diabetes Care, 33(Supplement 1), S62-S69.

ADA. (2013). Economic costs of diabetes in the US in 2012. Diabetes Care, 36(4), 1033-1046.

ADA. (2017). 2. Classification and diagnosis of diabetes. Diabetes Care, 40(Supplement 1), S11-S24.

ADA. (2018). 2. Classification and diagnosis of diabetes: standards of medical care in diabetes—2018. Diabetes Care, 41(Supplement 1), S13-S27.

Adeyinka, A., & Kondamudi, N. P. (2019). Hyperosmolar Hyperglycaemic Nonketotic Coma (HHNC, Hyperosmolar Hyperglycaemic Nonketotic Syndrome).

Adu, M. D., Malabu, U. H., Malau-Aduli, A. E., & Malau-Aduli, B. S. (2019). Enablers and barriers to effective diabetes self-management: A multi-national investigation. *PloS one*, *14*(6), e0217771.

Adwarth, J., Bache, N., Hegelund, M., Sir Hirst, M., Linnenkamp, U., & Magliano, D. (2015). IDF Diabetes Atlas 7th ed: International Diabetes Federation. In: Vancouver.

Agnoli C, Sieri S, Ricceri F, Giraudo MT, Masala G, Assedi M, Panico S, Mattiello A, Tumino R, Giurdanella MC, Krogh V. Adherence to a Mediterranean diet and long-term changes in weight and waist circumference in the EPIC-Italy cohort. Nutr Diabetes. 2018 Apr 25;8(1):22. doi: 10.1038/s41387-018-0023-3.

Ahmad, N., Adam, S. I. M., Nawi, A. M., Hassan, M. R., & Ghazi, H. F. (2016). Abdominal obesity indicators: Waist circumference or waist-to-hip ratio in Malaysian adults population. International journal of preventive medicine, 7.

Akter, S., Eguchi, M., Kochi, T., Kabe, I., Nanri, A., & Mizoue, T. (2020). Association of serum calcium and phosphate concentrations with glucose metabolism markers: the Furukawa nutrition and health study. *Nutrients*, *12*(8), 2344.

Akter, S., Rahman, M. M., Abe, S. K., & Sultana, P. (2014). Prevalence of diabetes and prediabetes and their risk factors among Bangladeshi adults: a nationwide survey. *Bulletin of the World Health Organization*, *92*, 204-213A.

Al-Abri M, Al-Hamhami A, Al-Nabhani H, Al-Zakwani I. Validation of the arabic version of the epworth sleepiness scale in oman. Oman medical journal. 2013 Nov;28(6):454.

Al Busaidi, N., Shanmugam, P., Manoharan, D., & Al Salmi, I. (2015). Glycaemic Control and Co morbidities of Patients with Type 1 and Type 2 Diabetes Referred to the National Diabetes and Endocrine Centre in Muscat, Oman. *J Diabetes Metab*, *6*(632), 2.

Al Hinai, H., Al Mufarji, K., Al Siyabi, H., Al Anqoudi, Z., Al Saadi, R., & Al Awaidy, S. (2020). Health promotion strategy as part of Vision 2050 in Oman: the way forward. *Global health promotion*, *27*(4), 145-149.

Al Mawali, A. H. N., Al Qasmi, A. M., Al Sabahi, S. M. S., Idikula, J., Abd Elaty, M. A., Morsi, M., & Al Hinai, A. T. (2017). Oman vision 2050 for health research: a strategic plan for the future based on the past and present experience. *Oman medical journal*, *32*(2), 86.

Al Riyami, A. A., & Afifi, M. (2003). Smoking in Oman: prevalence and characteristics of smokers. EMHJ-Eastern Mediterranean Health Journal, 10 (4-5), 600-609, 2004.

Al Riyami, A., Elaty, A., Attia, M., & Morsi, M. (2012). Oman World health survey: Part 1 methodology, sociodemographic profile and epidemiology of non-communicable diseases in Oman. Oman medical journal, 100(330), 1-19.

Al Slamah, T., Nicholl, B. I., Alslail, F. Y., & Melville, C. A. (2017). Self-management of type 2 diabetes in gulf cooperation council countries: A systematic review. *Plos one*, *12*(12), e0189160.

Al-Lawati, J. A. (2017). Diabetes mellitus: a local and global public health emergency!. *Oman medical journal*, *32*(3), 177.

Al-Lawati, J. A. (2017). Diabetes mellitus: a local and global public health emergency! Oman medical journal, 32(3), 177.

Al-Lawati, J. A., Barakat, M. N., Al-Zakwani, I., Elsayed, M. K., Al-Maskari, M., Al-Lawati, N. M., & Mohammed, A. J. (2012). Control of risk factors for cardiovascular disease among adults with previously diagnosed type 2 diabetes mellitus: a descriptive study from a middle eastern Arab population. The open cardiovascular medicine journal, 6, 133.

Al-Lawati, J. A., Panduranga, P., Al-Shaikh, H. A., Morsi, M., Mohsin, N., Khandekar, R. B., ... & Bayoumi, R. A. (2015). Epidemiology of Diabetes Mellitus in Oman: Results from two decades of research. *Sultan Qaboos University Medical Journal*, *15*(2), e226.

Al-Lawati, J. A., Panduranga, P., Al-Shaikh, H. A., Morsi, M., Mohsin, N., Khandekar, R. B., . . . Bayoumi, R. A. (2015). Epidemiology of Diabetes Mellitus in Oman: Results from two decades of research. Sultan Qaboos University Medical Journal, 15(2), e226.

Allensworth, D., Lawson, E., Nicholson, L., & Wyche, J. (1997). Models of Health Behaviour Change Used in Health Education Programs. In Schools & Health: Our Nation's Investment: National Academies Press (US).

Al-Mawali, A., Al-Harrasi, A., Jayapal, S. K., Morsi, M., Pinto, A. D., Al-Shekaili, W., ... & Idikula, J. (2021). Prevalence and risk factors of diabetes in a large community-based study in the Sultanate of Oman: STEPS survey 2017. *BMC Endocrine Disorders*, *21*(1), 1-11.

Al-Shookri, A., Khor, G., Chan, Y., Loke, S., & Al-Maskari, M. (2011). Type 2 diabetes in the sultanate of Oman. Malaysian journal of nutrition, 17(1).

Al Slamah, T., Nicholl, B. I., Alslail, F. Y., & Melville, C. A. (2017). Self-management of type 2 diabetes in gulf cooperation council countries: A systematic review. *Plos one*, *12*(12),

Álvarez-Álvarez, I., Martinez-Gonzalez, M. A., Sánchez-Tainta, A., Corella, D., Díaz-López, A., Fito, M., ... & Toledo, E. (2019). Adherence to an energy-restricted Mediterranean diet score and prevalence of cardiovascular risk factors in the PREDIMED-plus: a cross-sectional study. Revista Española de Cardiología (English Edition), 72(11), 925-934.

Alvarsson, A., Sandgren, B., Wendel, C., Alvarsson, M., & Brismar, K. (2012). A retrospective analysis of amputation rates in diabetic patients: can lower extremity amputations be further prevented? Cardiovascular diabetology, 11(1), 18.

Alyaarubi, S. (2011). Diabetes care in Oman: obstacles and solutions. Sultan Qaboos University Medical Journal, 11(3), 343.

Allen RP, Barker PB, Horská A, Earley CJ. Thalamic glutamate/glutamine in restless legs syndrome: increased and related to disturbed sleep. Neurology. 2013 May 28;80(22):2028-34.

American Diabetes Association. (2014). Diagnosis and classification of diabetes mellitus. Diabetes care, 37(Supplement_1), S81-S90.

American Diabetes Association. (2020). 2. Classification and diagnosis of diabetes: Standards of Medical Care in Diabetes—2020. Diabetes care, 43(Supplement_1), S14-S31.

American Diabetes Association. (2022). Introduction: Standards of Medical Care in Diabetes—2022. Diabetes Care, 45(Supplement_1), S1-S2.

Ang, S. H., Thevarajah, M., Alias, Y., & Khor, S. M. (2015). Current aspects in hemoglobin A1c detection: a review. Clinica chimica acta, 439, 202-211.

Aravinda, J. (2019). Risk factors in patients with type 2 diabetes in Bengaluru: A retrospective study. World Journal of Diabetes, 10(4), 241.

Aridi, Y. S., Walker, J. L., Roura, E., & Wright, O. R. (2020). Adherence to the Mediterranean diet and chronic disease in Australia: national nutrition and physical activity survey analysis. Nutrients, 12(5), 1251.

Aronne, L. J., Wadden, T., Isoldi, K. K., & Woodworth, K. A. (2009). When prevention fails: obesity treatment strategies. The American journal of medicine, 122(4 Suppl 1), S24.

Arthur, M. (2014). Institute for health metrics and evaluation. Nursing Standard (2014+), 28(42), 32.

Asfour, M., Samantray, S., Dua, A., & King, H. (1991). Diabetes mellitus in the sultanate of Oman. Diabetic medicine, 8(1), 76-80.

Asif, M. (2014). The prevention and control the type-2 diabetes by changing lifestyle and dietary pattern. Journal of education and health promotion, 3.

Association, A. D. (2007). Reduction in weight and cardiovascular disease risk factors in individuals with type 2 diabetes: one-year results of the look AHEAD trial. Diabetes Care, 30(6), 1374-1383.

Association, A. D. (2014). Executive summary: standards of medical care in diabetes—2014. In. USA: Am Diabetes Assoc.

Atlas, D. (2015). International diabetes federation. IDF Diabetes Atlas, 7th edn. Brussels, Belgium: International Diabetes Federation.

Bach-Faig, A., Fuentes-Bol, C., Ramos, D., Carrasco, J. L., Roman, B., Bertomeu, I. F., . . . Serra-Majem, L. (2011). The Mediterranean diet in Spain: adherence trends during the past two decades using the Mediterranean Adequacy Index. Public health nutrition, 14(4), 622-628.

Badedi, M., Solan, Y., Darraj, H., Sabai, A., Mahfouz, M., Alamodi, S., & Alsabaani, A. (2016). Factors associated with long-term control of type 2 diabetes mellitus. Journal of Diabetes Research, 2016.

Bae, J., Lage, M., Mo, D., Nelson, D., & Hoogwerf, B. (2016). Obesity and glycaemic control in patients with diabetes mellitus: Analysis of physician electronic health records in the US from 2009–2011. Journal of Diabetes and its Complications, 30(2), 212-220.

Baird, J., Hill, C. M., Harvey, N. C., Crozier, S., Robinson, S. M., Godfrey, K. M., . . . Group, S. S. (2016). Duration of sleep at 3 years of age is associated with fat and fat-free mass at 4 years of age: the Southampton Women's Survey. Journal of sleep research, 25(4), 412-418.

Barnaba, L., Intorre, F., Azzini, E., Ciarapica, D., Venneria, E., Foddai, M. S., ... & Polito, A. (2020). Evaluation of adherence to Mediterranean diet and association with clinical and biological markers in an Italian population. Nutrition, 77, 110813.

Bartholomew, L. K., Parcel, G. S., Kok, G., & Gottlieb, N. H. (2001). Intervention mapping: designing theory-and evidence-based health promotion programs: Mayfield Mountain View, CA.

Baskerville, R., Ricci-Cabello, I., Roberts, N., & Farmer, A. (2017). Impact of accelerometer and pedometer use on physical activity and glycaemic control in people with Type 2 diabetes: a systematic review and meta-analysis. *Diabetic Medicine*, *34*(5), 612-620.

Bassuk, S. S., & Manson, J. E. (2005). Epidemiological evidence for the role of physical activity in reducing risk of type 2 diabetes and cardiovascular disease. Journal of applied physiology.

Becker, M. H., Haefner, D. P., Kasl, S. V., Kirscht, J. P., Maiman, L. A., & Rosenstock, I. M. (1977). Selected psychosocial models and correlates of individual health-related behaviours. Medical care, 15(5), 27-46.

Bellou, V., Belbasis, L., Tzoulaki, I., & Evangelou, E. (2018). Risk factors for type 2 diabetes mellitus: An exposure-wide umbrella review of meta-analyses. PLoS One, 13(3), e0194127.

Bergenstal, R., Buse, J., & Peters, A. (2001). Endocrinology (3-volume set). Philadelphia: WB Saunders.

Bhupathiraju, S. N., & Hu, F. B. (2016). Epidemiology of obesity and diabetes and their cardiovascular complications. Circulation research, 118(11), 1723-1735.

Blomster, J. I., Zoungas, S., Chalmers, J., Li, Q., Chow, C. K., Woodward, M., . . . Harrap, S. (2014). The relationship between alcohol consumption and vascular complications and mortality in individuals with type 2 diabetes. Diabetes Care, 37(5), 1353-1359.

Bonora, E., & Tuomilehto, J. (2011). The pros and cons of diagnosing diabetes with A1C. Diabetes care, 34(Supplement 2), S184-S190.

Boulé, N. G., Haddad, E., Kenny, G. P., Wells, G. A., & Sigal, R. J. (2001). Effects of exercise on glycaemic control and body mass in type 2 diabetes mellitus: a meta-analysis of controlled clinical trials. Jama, 286(10), 1218-1227.

Bourne, R. R., Stevens, G. A., White, R. A., Smith, J. L., Flaxman, S. R., Price, H., . . . Naidoo, K. (2013). Causes of vision loss worldwide, 1990–2010: a systematic analysis. The lancet global health, 1(6), e339-e349.

Bradley, B. H. R. (2018). Dietary fat and risk for type 2 diabetes: A review of recent research. Current nutrition reports, 7(4), 214-226.

Bralić Lang, V., Bergman Marković, B., & Vrdoljak, D. (2015). The association of lifestyle and stress with poor glycaemic control in patients with diabetes mellitus type 2: a Croatian nationwide primary care cross-sectional study. Croatian medical journal, 56(4), 357-365.

Byrne, D. W., Rolando, L. A., Aliyu, M. H., McGown, P. W., Connor, L. R., Awalt, B. M., . . . Yarbrough, M. I. (2016). Modifiable healthy lifestyle behaviours: 10-year health outcomes from a health promotion program. American journal of preventive medicine, 51(6), 1027-1037.

Cade, W. T. (2008). Diabetes-related microvascular and macrovascular diseases in the physical therapy setting. Physical therapy, 88(11), 1322-1335.

Campanini M.Z., Guallar-Castillón P., Rodríguez-Artalejo F., Lopez-Garcia E. Mediterranean Diet and Changes in Sleep Duration. *Sleep.* 2017;40 doi: 10.1093/sleep/zsw083.

Canoy, D., Wareham, N., Luben, R., Welch, A., Bingham, S., Day, N., & Khaw, K. T. (2005). Cigarette Smoking and Fat Distribution in 21, 828 British Men and Women: A Population-based Study. Obesity research, 13(8), 1466-1475.

Cantley, J., & Ashcroft, F. M. (2015). Q&A: insulin secretion and type 2 diabetes: why do β-cells fail? BMC biology, 13(1), 33.

Care, D. (2018). Economic Costs of Diabetes in the US in 2017. *Diabetes Care*, *41*, 917.

Carlos S, De La Fuente-Arrillaga C, Bes-Rastrollo M, Razquin C, Rico-Campà A, Martínez-González MA, Ruiz-Canela M. Mediterranean Diet and Health Outcomes in the SUN Cohort. Nutrients. 2018 Mar 31;10(4):439. doi: 10.3390/nu10040439.

Carpenter, C. J. (2010). A meta-analysis of the effectiveness of health belief model variables in predicting behaviour. Health communication, 25(8), 661-669.

Castro-Diehl C., Wood A.C., Redline S., Reid M., Johnson D.A., Maras J.E., Jacobs D.R., Shea S., Crawford A., St-Onge M.-P. Mediterranean diet pattern and sleep duration and insomnia symptoms in the Multi-Ethnic Study of Atherosclerosis. *Sleep.* 2018;41:zsy158. doi: 10.1093/sleep/zsy158.

Champion, V. L., & Skinner, C. S. (2008). The health belief model. Health behaviour and health education: Theory, research, and practice, 4, 45-65.

Chan, R. S., & Woo, J. (2010). Prevention of overweight and obesity: how effective is the current public health approach. International journal of environmental research and public health, 7(3), 765-783.

Chang, S. A. (2012). Smoking and type 2 diabetes mellitus. Diabetes & metabolism journal, 36(6), 399-403.

Chiva-Blanch, G., Badimon, L., & Estruch, R. (2014). Latest evidence of the effects of the Mediterranean diet in prevention of cardiovascular disease. Current atherosclerosis reports, 16(10), 1-7.

Collaboration, E. R. F. (2010). Diabetes mellitus, fasting blood glucose concentration, and risk of vascular disease: a collaborative meta-analysis of 102 prospective studies. The Lancet, 375(9733), 2215-2222.

Collaboration, N. R. F. (2016). Worldwide trends in diabetes since 1980. The Lancet.

Control, C. f. D., & Prevention. (2008). Low-energy-dense foods and weight management: cutting calories while controlling hunger. Atlanta, GA: CDC.

Czech, M. P. (2017). Insulin action and resistance in obesity and type 2 diabetes. Nature medicine, 23(7), 804-814.

Dagan, S. S., Segev, S., Novikov, I., & Dankner, R. (2013). Waist circumference vs body mass index in association with cardiorespiratory fitness in healthy men and women: a cross sectional analysis of 403 subjects. Nutrition journal, 12(1), 12.

Damasceno, N. R., Sala-Vila, A., Cofán, M., Pérez-Heras, A. M., Fitó, M., Ruiz-Gutiérrez, V., ... & Ros, E. (2013). Mediterranean diet supplemented with nuts reduces waist circumference and shifts lipoprotein subfractions to a less atherogenic pattern in subjects at high cardiovascular risk. Atherosclerosis, 230(2), 347-353.

Davis, C. R., Bryan, J., Hodgson, J. M., Woodman, R., & Murphy, K. J. (2017). A Mediterranean diet reduces F2-isoprostanes and triglycerides among older Australian men and women after 6 months. *The Journal of nutrition*, *147*(7), 1348-1355.

Davis, C., Bryan, J., Hodgson, J., & Murphy, K. (2015). Definition of the Mediterranean diet; a literature review. Nutrients, 7(11), 9139-9153.

Davis, R., Campbell, R., Hildon, Z., Hobbs, L., & Michie, S. (2015). Theories of behaviour and behaviour change across the social and behavioural sciences: a scoping review. Health psychology review, 9(3), 323-344.

De Boer, I. H., Bangalore, S., Benetos, A., Davis, A. M., Michos, E. D., Muntner, P., . . . Bakris, G. (2017). Diabetes and hypertension: a position statement by the American Diabetes Association. Diabetes Care, 40(9), 1273-1284.

DeFronzo, R. A. (2009). From the triumvirate to the „ominous octet": a new paradigm for the treatment of type 2 diabetes mellitus. Clinical Diabetology, 10(3), 101-128.

Díez-Espino, J., Buil-Cosiales, P., Serrano-Martínez, M., Toledo, E., Salas-Salvadó, J., & Martínez-González, M. Á. (2011). Adherence to the Mediterranean diet in patients with type 2 diabetes mellitus and HbA1c level. Annals of Nutrition and Metabolism, 58(1), 74-78.

Dinu, M., Pagliai, G., Casini, A., & Sofi, F. (2018). Mediterranean diet and multiple health outcomes: an umbrella review of meta-analyses of observational studies and randomised trials. European journal of clinical nutrition, 72(1), 30-43.

Donnan, P. T., Leese, G. P., Morris, A. D., & Audit, D. (2000). Hospitalizations for people with type 1 and type 2 diabetes compared with the nondiabetic population of Tayside, Scotland: a retrospective cohort study of resource use. *Diabetes care*, *23*(12), 1774-1779.

Eeg-Olofsson, K., Zethelius, B., Gudbjörnsdottir, S., Eliasson, B., Svensson, A.-M., & Cederholm, J. (2016). Considerably decreased risk of cardiovascular disease with combined reductions in HbA1c, blood pressure and blood lipids in type 2 diabetes: report from the Swedish National Diabetes Register. Diabetes and Vascular Disease Research, 13(4), 268-277.

Elhayany, A., Lustman, A., Abel, R., Attal-Singer, J., & Vinker, S. (2010). A low carbohydrate Mediterranean diet improves cardiovascular risk factors and diabetes control among overweight patients with type 2 diabetes mellitus: a 1-year prospective randomized intervention study. Diabetes, Obesity and Metabolism, 12(3), 204-209.

Esposito, K., & Giugliano, D. (2014). Mediterranean diet and type 2 diabetes. Diabetes/metabolism research and reviews, 30(S1), 34-40.

Esposito, K., Kastorini, C.-M., Panagiotakos, D. B., & Giugliano, D. (2011). Mediterranean diet and weight loss: meta-analysis of randomized controlled trials. Metabolic syndrome and related disorders, 9(1), 1-12.

Esposito, K., Maiorino, M. I., Bellastella, G., Chiodini, P., Panagiotakos, D., & Giugliano, D. (2015). A journey into a Mediterranean diet and type 2 diabetes: a systematic review with meta-analyses. BMJ Open, 5(8).

Esposito, K., Maiorino, M. I., Ceriello, A., & Giugliano, D. (2010). Prevention and control of type 2 diabetes by Mediterranean diet: a systematic review. Diabetes research and clinical practice, 89(2), 97-102.

Esposito, K., Maiorino, M. I., Ciotola, M., Di Palo, C., Scognamiglio, P., Gicchino, M., . . . Ceriello, A. (2009). Effects of a Mediterranean-style diet on the need for antihyperglycaemic drug therapy in patients with newly diagnosed type 2 diabetes: a randomized trial. Ann Intern Med, 151(5), 306-314.

Esposito, K., Maiorino, M., Di Palo, C., Giugliano, D., & Group, C. P. H. S. (2009). Adherence to a Mediterranean diet and glycaemic control in Type 2 diabetes mellitus. Diabetic medicine, 26(9), 900-907.

Estruch, R., Martínez-González, M. A., Corella, D., Salas-Salvadó, J., Fitó, M., Chiva-Blanch, G., . . . Lapetra, J. (2016). Retracted: Effect of a high-fat Mediterranean diet on bodyweight and waist circumference: a prespecified secondary outcomes analysis of the PREDIMED randomised controlled trial. The lancet Diabetes & endocrinology, 4(8), 666-676.

Estruch, R., Martínez-González, M. A., Corella, D., Salas-Salvadó, J., Ruiz-Gutiérrez, V., Covas, M. I., . . . Vinyoles, E. (2006). Effects of a Mediterranean-style diet on cardiovascular risk factors: a randomized trial. Ann Intern Med, 145(1), 1-11.

Europe, W. (2016). The Challenge of Obesity in the WHO European Region and the Strategies for Response; Summary. In.

Evert, A. B., Boucher, J. L., Cypress, M., Dunbar, S. A., Franz, M. J., Mayer-Davis, E. J., . . . Urbanski, P. (2014). Nutrition therapy recommendations for the management of adults with diabetes. Diabetes Care, 37(Supplement 1), S120-S143.

Farazi, S., Feyen, E., & Rocha, R. (2011). Bank ownership and performance in the Middle East and North Africa Region: The World Bank.

Fernandez, M. A., & Marette, A. (2020). Dairy products and diabetes: Role of protein on glycaemic control. In Milk and Dairy Foods (pp. 173-203). Academic Press.

Fertman, C. I., & Allensworth, D. D. (2016). Health promotion programs: from theory to practice: John Wiley & Sons.

Filippatos TD, Panagiotakos DB, Georgousopoulou EN, Pitaraki E, Kouli G-M, Chrysohoou C, et al. Mediterranean diet and 10-year (2002-2012) incidence of diabetes and cardiovascular disease in participants with prediabetes: the ATTICA study. The review of diabetic studies: RDS. 2016;13(4):226.

Franz, M. J., Boucher, J. L., & Evert, A. B. (2014). Evidence-based diabetes nutrition therapy recommendations are effective: the key is individualization. Diabetes, metabolic syndrome and obesity: targets and therapy, 7, 65.

Freeland-Graves, J. H., & Nitzke, S. (2013). Position of the academy of nutrition and dietetics: total diet approach to healthy eating. Journal of the Academy of Nutrition and Dietetics, 113(2), 307-317.

Galbete, C., Kröger, J., Jannasch, F., Iqbal, K., Schwingshackl, L., Schwedhelm, C., ... & Schulze, M. B. (2018). Nordic diet, Mediterranean diet, and the risk of chronic diseases: the EPIC-Potsdam study. *BMC Medicine*, 16(1), 1-13.

Ganguly, S. S., Al Shafaee, M. A., Al Lawati, J. A., Dutta, P. K., & Duttagupta, K. K. (2009). Epidemiological transition of some diseases in Oman: a situational analysis. *EMHJ-Eastern Mediterranean Health Journal*, 15 (1), 209-218.

Gao, M., Jebb, S. A., Aveyard, P., Ambrosini, G. L., Perez-Cornago, A., Carter, J., ... & Piernas, C. (2021). Associations between dietary patterns and the incidence of total and fatal cardiovascular disease and all-cause mortality in 116,806 individuals from the UK Biobank: a prospective cohort study. *BMC medicine*, *19*(1), 1-12.

George, E. S., Kucianski, T., Mayr, H. L., Moschonis, G., Tierney, A. C., & Itsiopoulos, C. (2018). A Mediterranean diet model in Australia: strategies for translating the traditional Mediterranean diet into a multicultural setting. *Nutrients*, *10*(4), 465.

Gillett, M., Royle, P., Snaith, A., Scotland, G., Poobalan, A., Imamura, M., . . . Wyness, L. (2012). Non-pharmacological interventions to reduce the risk of diabetes in people with impaired glucose regulation: a systematic review and economic evaluation. *Health technology assessment*.

Gillibrand, R., & Stevenson, J. (2006). The extended health belief model applied to the experience of diabetes in young people. *British Journal of Health Psychology*, *11*(1), 155-169.

Gipson, P., & King, C. (2012). Health behaviour theories and research: Implications for suicidal individuals' treatment linkage and adherence. Cognitive and behavioural practice, 19(2), 209-217.

Glanz, K. (1997). Theory at a glance: A guide for health promotion practice: US Department of Health and Human Services, Public Health Service, National ….

Glanz, K., Rimer, B. K., & Viswanath, K. (2008). Health behaviour and health education: theory, research, and practice: John Wiley & Sons.

Glasgow, R. E., & Linnan, L. A. (2008). Evaluation of theory-based interventions. Health Behaviour, 487.

Godos, J., Ferri, R., Caraci, F., Cosentino, F. I. I., Castellano, S., Galvano, F., & Grosso, G. (2019). Adherence to the mediterranean diet is associated with better sleep quality in Italian adults. *Nutrients*, 11(5), 976.

Gomes, J. M. G., de Assis Costa, J., & Alfenas, R. D. C. G. (2017). Dietary calcium from dairy, body composition and glycaemic control in patients with type 2 diabetes pursuing an energy restricted diet: A parallel group randomised clinical trial. *International Dairy Journal*, 73, 50-56.

Gong, Q., Zhang, P., Wang, J., Ma, J., An, Y., Chen, Y., ... & Li, G. (2018). Reducing Morbidity and Mortality in Type 2 Diabetes by Lifestyle Intervention: 30-Year Follow-Up of the Da Qing Diabetes Prevention Study.

Gotsis, E., Anagnostis, P., Mariolis, A., Vlachou, A., Katsiki, N., & Karagiannis, A. (2015). Health benefits of the Mediterranean diet: an update of research over the last 5 years. *Angiology*, 66(4), 304-318.

Grant, R. W., & Kirkman, M. S. (2015). Trends in the evidence level for the American Diabetes Association's "Standards of Medical Care in Diabetes" from 2005 to 2014. *Diabetes Care*, 38(1), 6-8.

Gray, A., & Threlkeld, R. J. (2019). Nutritional recommendations for individuals with diabetes. In Endotext [Internet]: MEDDIETText. com, Inc.

Grosso, G., Godos, J., Lamuela-Raventos, R., Ray, S., Micek, A., Pajak, A., . . . Galvano, F. (2017). A comprehensive meta-analysis on dietary flavonoid and lignan intake and cancer risk: Level of evidence and limitations. *Molecular Nutrition & Food Research*, 61(4), 1600930.

Grosso, G., Pajak, A., Mistretta, A., Marventano, S., Raciti, T., Buscemi, S., . . . Galvano, F. (2014). Protective role of the Mediterranean diet on several cardiovascular risk factors: evidence from Sicily, southern Italy. *Nutrition, Metabolism and Cardiovascular Diseases*, 24(4), 370-377.

Gulliford, M., & Ukoumunne, O. (2001). Determinants of glycated haemoglobin in the general population: associations with diet, alcohol and cigarette smoking. *European Journal of Clinical Nutrition*, 55(7), 615-623.

Haghighatpanah, M., Nejad, A. S. M., Haghighatpanah, M., Thunga, G., & Mallayasamy, S. (2018). Factors that correlate with poor glycaemic control in type 2 diabetes mellitus patients with complications. *Osong public Health and Research Perspective*s, 9(4), 167.

Harding, J. L., Benoit, S. R., Gregg, E. W., Pavkov, M. E., & Perreault, L. (2020). Trends in rates of infections requiring hospitalization among adults with versus without diabetes in the US, 2000–2015. *Diabetes Care*, *43*(1), 106-116.

Harreiter, J., & Roden, M. (2019). [Diabetes mellitus-Definition, classification, diagnosis, screening and prevention (Update 2019)]. Wien Klin Wochenschr, 131(Suppl 1), 6-15.

Harrison, J. A., Mullen, P. D., & Green, L. W. (1992). A meta-analysis of studies of the health belief model with adults. *Health Education Research*, 7(1), 107-116.

Hart, C. N., Carskadon, M. A., Considine, R. V., Fava, J. L., Lawton, J., Raynor, H. A., . . . Wing, R. (2013). Changes in children's sleep duration on food intake, weight, and leptin. *Pediatrics*, 132(6), e1473-e1480.

Hashimoto, Y., Sakai, R., Ikeda, K., & Fukui, M. (2020). Association between sleep disorder and quality of life in patients with type 2 diabetes: a cross-sectional study. *BMC Endocrine Disorders*, 20(1), 1-8.

Hazavehei, S., Sharifirad, G., & Mohabi, S. (2007). The effect of educational program based on health belief model on diabetic foot care. International *Journal of Diabetes in Developing Countries*, 27(1).

Herforth, A., Arimond, M., Álvarez-Sánchez, C., Coates, J., Christianson, K., & Muehlhoff, E. (2019). A global review of food-based dietary guidelines. *Advances in Nutrition*, *10*(4), 590-605.

Hernáez, Á., Castañer, O., Goday, A., Ros, E., Pintó, X., Estruch, R., ... & Fitó, M. (2017). The Mediterranean Diet decreases LDL atherogenicity in high cardiovascular risk individuals: A randomized controlled trial. *Molecular Nutrition & Food Research*, *61*(9), 1601015.

Hernáez, Á., Castañer, O., Elosua, R., Pintó, X., Estruch, R., Salas-Salvadó, J., ... & Fitó, M. (2017). Mediterranean diet improves high-density lipoprotein function in high-cardiovascular-risk individuals: a randomized controlled trial. *Circulation*, 135(7), 633-643.

Hippisley-Cox, J., & Coupland, C. (2016). Diabetes treatments and risk of amputation, blindness, severe kidney failure, hyperglycaemia, and hypoglycaemia: open cohort study in primary care. *BMJ*, 352, i1450.

Hoevenaar-Blom, M. P., Spijkerman, A. M., Kromhout, D., & Verschuren, W. M. (2014). Sufficient sleep duration contributes to lower cardiovascular disease risk in addition to four traditional lifestyle factors: the MORGEN study. *European journal of preventive cardiology*, 21(11), 1367-1375.

Hogenkamp, P. S., Nilsson, E., Nilsson, V. C., Chapman, C. D., Vogel, H., Lundberg, L. S., ... & Schiöth, H. B. (2013). Acute sleep deprivation increases portion size and affects food choice in young men. *Psychoneuroendocrinology*, 38(9), 1668-1674.

Honka, M.-J., Latva-Rasku, A., Bucci, M., Virtanen, K. A., Hannukainen, J. C., Kalliokoski, K. K., & Nuutila, P. (2018). Insulin-stimulated glucose uptake in skeletal muscle, adipose tissue and liver: a positron emission tomography study. *European journal of endocrinology*, 178(5), 523-531.

Hordern, M. D., Dunstan, D. W., Prins, J. B., Baker, M. K., Singh, M. A. F., & Coombes, J. S. (2012). Exercise prescription for patients with type 2 diabetes and pre-diabetes: a position statement from Exercise and Sport Science Australia. *Journal of Science and Medicine in Sport*, 15(1), 25-31.

Huang, X., Jiménez-Moleón, J. J., Lindholm, B., Cederholm, T., Ärnlöv, J., Risérus, U., ... & Carrero, J. J. (2013). Mediterranean diet, kidney function, and mortality in men with CKD. Clinical Journal of the American Society of Nephrology, 8(9), 1548-1555.

IDF. (2016). International Diabetes Federation 7th Edition, 2015. In: Nov.

International Diabetes Federation (2011). Retrieved from http://www.idf.org/diabetesatlas/5e/the-global-burden

International Diabetes Federation. (2011). IDF Diabetes Atlas. International Diabetes Federation, Executive Office. Retrieved from http://www.idf.org/sites/default/files/21991_diabAtlas_5thEd.pdf

International Diabetes Federation. IDF Diabetes Atlas. (2019). Report No.: Ninth Edition 2019. Available from: diabetesatlas.org/en/resources.

Isac, C., & Abraham, J. (2020). Daytime sleepiness among Omani Nursing Students: Estimate of its determinants and impact on perceived stress. *Clinical Epidemiology and Global Health*, *8*(3), 739-743.

Jacobs Jr, D. R., Petersen, K. S., Svendsen, K., Ros, E., Sloan, C. B., Steffen, L. M., ... & Kris-Etherton, P. M. (2018). Considerations to facilitate a US study that replicates PREDIMED. Metabolism, 85, 361-367.

Jaussent I., Dauvilliers Y., Ancelin M.-L., Dartigues J.-F., Tavernier B., Touchon J., Ritchie K., Besset A. Insomnia Symptoms in Older Adults: Associated Factors and Gender Differences. *Am. J. Geriatr. Psychiatry*. 2011;19:88–97. doi: 10.1097/JGP.0b013e3181e049b6.

Janz, N. K., & Becker, M. H. (1984). The health belief model: A decade later. Health education quarterly, 11(1), 1-47.

Jaussent, I., Dauvilliers, Y., Ancelin, M.-L., Dartigues, J.-F., Tavernier, B., Touchon, J., . . . Besset, A. (2011). Insomnia symptoms in older adults: associated factors and gender differences. The American Journal of Geriatric Psychiatry, 19(1), 88-97.

Jeihooni, A. K., Hidarnia, A., Kaveh, M. H., Hajizadeh, E., & Askari, A. (2015). The effect of an educational program based on health belief model on preventing osteoporosis in women. International journal of preventive medicine, 6.

Jennum, P., Stender-Petersen, K., Rabøl, R., Jørgensen, N. R., Chu, P. L., & Madsbad, S. (2015). The impact of nocturnal hypoglycemia on sleep in subjects with type 2 diabetes. Diabetes Care, 38(11), 2151-2157.

Jones, C. L., Jensen, J. D., Scherr, C. L., Brown, N. R., Christy, K., & Weaver, J. (2015). The health belief model as an explanatory framework in communication research: exploring parallel, serial, and moderated mediation. Health communication, 30(6), 566-576.

Jorvand, R., Ghofranipour, F., HaeriMehrizi, A., & Tavousi, M. (2020). Evaluating the impact of HBM-based education on exercise among health care workers: the usage of mobile applications in Iran. BMC Public Health, 20, 1-11.

Kafatos, A., Verhagen, H., Moschandreas, J., Apostolaki, I., & Van Westerop, J. J. (2000). Mediterranean diet of Crete: foods and nutrient content. Journal of the American Dietetic Association, 100(12), 1487-1493.

Kamath, A., Shivaprakash, G., & Adhikari, P. (2011). Body mass index and waist circumference in type 2 diabetes mellitus patients attending a diabetes clinic. International Journal of Biological & Medical Research, 2(3), 636-638.

Karanicolas, P. J., Farrokhyar, F., & Bhandari, M. (2010). Blinding: who, what, when, why, how?. *Canadian journal of surgery*, *53*(5), 345.

Karayiannis, D., Kontogianni, M. D., Mendorou, C., Douka, L., Mastrominas, M., & Yiannakouris, N. (2017). Association between adherence to the Mediterranean diet and semen quality parameters in male partners of couples attempting fertility. Human reproduction, 32(1), 215-222.

Kashfi, S., Jeihooni, A. K., Rezaianzadeh, A., & Amini, S. (2012). The effect of health belief model educational program and jogging on control of sugar in type 2 diabetic patients. Iranian Red Crescent Medical Journal, 14(7), 442.

Kastorini, C. M., Panagiotakos, D. B., Chrysohoou, C., Georgousopoulou, E., Pitaraki, E., Puddu, P. E., ... & ATTICA Study Group. (2016). Metabolic syndrome, adherence to the Mediterranean diet and 10-year cardiovascular disease incidence: The ATTICA study. Atherosclerosis, 246, 87-93.

Kelly, M. P., & Barker, M. (2016). Why is changing health-related behaviour so difficult? Public health, 136, 109-116.

Kerner, W., Bruckel, J., & German Diabetes, A. (2014). Definition, classification and diagnosis of diabetes mellitus. Exp Clin Endocrinol Diabetes, 122(7), 384-386.

Keskin, A., Ünalacak, M., Bilge, U., Yildiz, P., Güler, S., Selçuk, E. B., & Bilgin, M. (2015). Effects of sleep disorders on hemoglobin A1c levels in type 2 diabetic patients. *Chinese medical journal*, *128*(24), 3292.

Kesse-Guyot, E., Ahluwalia, N., Lassale, C., Hercberg, S., Fezeu, L., & Lairon, D. (2013). Adherence to Mediterranean diet reduces the risk of metabolic syndrome: a 6-year prospective study. Nutrition, Metabolism and Cardiovascular Diseases, 23(7), 677-683.

Keys, A. (1980). Seven countries. A multivariate analysis of death and coronary heart disease: Harvard University Press.

Khatib, O. (2004). Noncommunicable diseases: risk factors and regional strategies for prevention and care. EMHJ-Eastern Mediterranean Health Journal, 10 (6), 778-788, 2004.

Khattab, M., Khader, Y. S., Al-Khawaldeh, A., & Ajlouni, K. (2010). Factors associated with poor glycaemic control among patients with type 2 diabetes. Journal of Diabetes and its Complications, 24(2), 84-89.

Kim, Y., & Je, Y. (2018). A modified Mediterranean diet score is inversely associated with metabolic syndrome in Korean adults. *European Journal of Clinical Nutrition*, *72*(12), 1682-1689.

King, P., Peacock, I., & Donnelly, R. (1999). The UK prospective diabetes study (UKPDS): clinical and therapeutic implications for type 2 diabetes. British journal of clinical pharmacology, 48(5), 643.

Knudsen, A., (2019). Disease burden in the Nordic region. Results from the Global Burden of Disease Study 2017 (GBD 2017). *European Journal of Public Health*, *29*(Supplement_4), ckz185-161.

Koloverou, E., Esposito, K., Giugliano, D., & Panagiotakos, D. (2014). The effect of Mediterranean diet on the development of type 2 diabetes mellitus: a meta-analysis of 10 prospective studies and 136,846 participants. Metabolism, 63(7), 903-911.

Kromhout, D., Menotti, A., Bloemberg, B., Aravanis, C., Blackburn, H., Buzina, R., . . . Jansen, A. (1995). Dietary saturated and transfatty acids and cholesterol and 25-year mortality from coronary heart disease: the seven countries study. Preventive medicine, 24(3), 308-315.

Kundam, D. N., Acham, I. O., & Girgih, A. T. (2018). Bioactive compounds in fish and their health benefits. *Asian Food Sci. J*, *4*, 1-14.

Kwasnicka, D., Dombrowski, S. U., White, M., & Sniehotta, F. (2016). Theoretical explanations for maintenance of behaviour change: a systematic review of behaviour theories. Health psychology review, 10(3), 277-296.

Lee, J., Pase, M., Pipingas, A., Raubenheimer, J., Thurgood, M., Villalon, L., ... & Scholey, A. (2015). Switching to a 10-day Mediterranean-style diet improves mood and cardiovascular function in a controlled crossover study. Nutrition, 31(5), 647-652.

Lee, S.-K., Shin, D.-H., Kim, Y.-H., & Lee, K.-S. (2019). Effect of diabetes education through pattern management on self-care and self-efficacy in patients with type 2 diabetes. International journal of environmental research and public health, 16(18), 3323.

León, E. A., Henriquez, P., & Serra-Majem, L. (2006). Mediterranean diet and metabolic syndrome: a cross-sectional study in the Canary Islands. Public health nutrition, 9(8A), 1089-1098.

Ley, S. H., Ha MedDiety, O., Mohan, V., & Hu, F. B. (2014). Prevention and management of type 2 diabetes: dietary components and nutritional strategies. The Lancet, 383(9933), 1999-2007.

Liao, Y.-L., Lin, S.-C., & Hsu, C.-H. (2011). Waist circumference is a better predictor than body mass index of insulin resistance in type 2 diabetes. Int J Diabetes & Metab, 19, 35-40.

Ma, C.-M., Lu, N., Wang, R., Liu, X.-L., Lu, Q., & Yin, F.-Z. (2017). Three novel obese indicators perform better in monitoring management of metabolic syndrome in type 2 diabetes. Scientific reports, 7(1), 1-6.

Mabry, R., Owen, N. and Eakin, E., 2014. A national strategy for promoting physical activity in Oman: a call for action. Sultan Qaboos University Medical Journal, 14(2), p.e170.

Mahdavi-Roshan, M., Salari, A., Ashouri, A., & Alizadeh, I. (2019). Association between depression symptoms and Mediterian dietary adherence in adults with cardiovascular disease risk factors in the north of Iran in 2016. *Polish Annals of Medicine*, *26*(1).

Majeed, A., El-Sayed, A. A., Khoja, T., Alshamsan, R., Millett, C., & Rawaf, S. (2014). Diabetes in the Middle-East and North Africa: an update. Diabetes research and clinical practice, 103(2), 218-222.

Majeed, A., El-Sayed, A. A., Khoja, T., Alshamsan, R., Millett, C., & Rawaf, S. (2014). Diabetes in the Middle-East and North Africa: an update. Diabetes research and clinical practice, 103(2), 218-222.

Mamalaki E., Anastasiou C.A., Ntanasi E., Tsapanou A., Kosmidis M.H., Dardiotis E., Hadjigeorgiou G.M., Sakka P., Scarmeas N., Yannakoulia M. Associations between the mediterranean diet and sleep in older adults: Results from the hellenic longitudinal investigation of aging and diet study. *Geriatr. Gerontol. Int.* 2018;18:1543–1548. doi: 10.1111/ggi.13521.

Mamtani, M. R., & Kulkarni, H. R. (2005). Predictive performance of anthropometric indexes of central obesity for the risk of type 2 diabetes. Archives of medical research, 36(5), 581-589.

Mancini, J. G., Filion, K. B., Atallah, R., & Eisenberg, M. J. (2016). Systematic review of the Mediterranean diet for long-term weight loss. The American journal of medicine, 129(4), 407-415. e404.

Marshall, J. A., & Bessesen, D. H. (2002). Dietary fat and the development of type 2 diabetes. In: Am Diabetes Assoc.

Martínez-González, M. A., Salas-Salvadó, J., Estruch, R., Corella, D., Fitó, M., Ros, E., & Predimed Investigators. (2015). Benefits of the Mediterranean diet: insights from the PREDIMED study. Progress in cardiovascular diseases, 58(1), 50-60.

Martínez-González, M. Á., & Sánchez-Villegas, A. (2004). The emerging role of Mediterranean diets in cardiovascular epidemiology: monounsaturated fats, olive oil, red wine or the whole pattern? European journal of epidemiology, 19(1), 9-13.

Martínez-González, M. Á., De la Fuente-Arrillaga, C., Nunez-Cordoba, J., Basterra-Gortari, F., Beunza, J. J., Vazquez, Z., . . . Bes-Rastrollo, M. (2008). Adherence to Mediterranean diet and risk of developing diabetes: prospective cohort study. Bmj, 336(7657), 1348-1351.

Mattei, J., Sotos-Prieto, M., Bigornia, S. J., Noel, S. E., & Tucker, K. L. (2017). The Mediterranean diet score is more strongly associated with favorable cardiometabolic risk factors over 2 years than other diet quality indexes in Puerto Rican adults. The Journal of nutrition, 147(4), 661-669.

Mayer-Davis, E. J., & Costacou, T. (2001). Obesity and sedentary lifestyle: modifiable risk factors for prevention of type 2 diabetes. Current diabetes reports, 1(2), 170-176.

Mayr, H. L., Tierney, A. C., Kucianski, T., Thomas, C. J., & Itsiopoulos, C. (2019). Australian patients with coronary heart disease achieve high adherence to 6-

month Mediterranean diet intervention: preliminary results of the AUSMED Heart Trial. Nutrition, 61, 21-31.

Mayr, H. L., Itsiopoulos, C., Tierney, A. C., Kucianski, T., Radcliffe, J., Garg, M., ... & Thomas, C. J. (2019). Ad libitum Mediterranean diet reduces subcutaneous but not visceral fat in patients with coronary heart disease: A randomised controlled pilot study. *Clinical nutrition ESPEN*, 32, 61-69.

Meisinger, C., Löwel, H., Thorand, B., & Döring, A. (2005). Leisure time physical activity and the risk of type 2 diabetes in men and women from the general population. *Diabetologia*, 48(1), 27-34.

Méndez-Hernández, P., Flores, Y., Siani, C., Lamure, M., Dosamantes-Carrasco, L. D., Halley-Castillo, E., . . . Salmerón, J. (2009). Physical activity and risk of metabolic syndrome in an urban Mexican cohort. *BMC Public Health*, 9(1), 276.

Mensing, C., Boucher, J., Cypress, M., Weinger, K., Mulcahy, K., Barta, P., . . . Lamb, B. (2006). National standards for diabetes self-management education. Diabetes Care, 29(suppl 1), s78-s85.

Ministry of Health, Sultanate Oman (2009) Omani Guide to Healthy Eating. Available at http://www.fao.org/3/as845e/as845e.pdf. Assessed on 24th July 2021

Ministry of Health, Sultanate Oman (2015) Diabetes Mellitus Management Guideline. Available at https://www.moh.gov.om/documents/272928/1314763/Diabetes+Mellitus+management+guidelines+3rd+edition+++2015%281%29.pdf/bafeceed-1a79-4e78-9166-9afee4ad3bf9 . Assessed on 24th July 2021.

Ministry of Health: Oman (2020). *Royal Hospital* https://www.moh.gov.om/en/web/royal-hospital/overview (accessed 22 July, 2021).

Ministry of Health. *Health Vision 2050 (2015): Synopsis of Strategic Studies*; Ministry of Health: Muscat, Oman, https://www.mdpi.com/1660-4601/19/11/6929 (accessed 17 February 2023)

Mirmiran, P., Moslehi, N., Mahmoudof, H., Sadeghi, M., & Azizi, F. (2015). A longitudinal study of adherence to the Mediterranean dietary pattern and metabolic syndrome in a non-Mediterranean population. *International Journal of Endocrinology and Metabolism*, 13(3).

Mitri, J., Tomah, S., Mottalib, A., Salsberg, V., Ashrafzadeh, S., Pober, D. M., ... & Ha MedDiety, O. (2020). Effect of dairy consumption and its fat content on glycaemic control and cardiovascular disease risk factors in patients with type 2 diabetes: A randomized controlled study. *The American Journal of Clinical Nutrition*, 112(2), 293-302.

Mohamed, M., Denis, L., & Rekia, B. (2015). Mediterranean Diet and Metabolic Syndrome in Adult Moroccan Women. Journal of Research in Obesity, 2015, 15-32.

Mohammadi, S., Karim, N. A., Talib, R. A., & Amani, R. (2018). The impact of self-efficacy education based on the health belief model in Iranian patients with type 2 diabetes: a randomised controlled intervention study. *Asia Pacific journal of clinical nutrition*, 27(3).

Mohan, V., Shah, S., & Saboo, B. (2013). Current glycaemic status and diabetes related complications among type 2 diabetes patients in India: data from the A1chieve study. *The Journal of the Association of Physicians of India*, 61(1), 12-15.

Moore, S. E., McEvoy, C. T., Prior, L., Lawton, J., Patterson, C. C., Kee, F., ... & Woodside, J. V. (2018). Barriers to adopting a Mediterranean diet in Northern European adults at high risk of developing cardiovascular disease. *Journal of Human Nutrition and Dietetics*, 31(4), 451-462.

Morgan, S. A., Ali, M. M., Channon, A. A., Al-Sabahi, S., Al Suwaidi, H., Osman, N., ... & Khoja, T. (2019). Prevalence and correlates of diabetes and its comorbidities in four Gulf Cooperation Council countries: evidence from the World Health Survey Plus. *J Epidemiol Community Health*, *73*(7), 630-636.

Morrow, J. D., Frei, B., Longmire, A. W., Gaziano, J. M., Lynch, S. M., Shyr, Y., . . . Roberts, L. J. (1995). Increase in circulating products of lipid peroxidation (F2-isoprostanes) in smokers—smoking as a cause of oxidative damage. *New England Journal of Medicine*, 332(18), 1198-1203.

Mozaffarian, D. (2019). Dairy foods, obesity, and metabolic health: the role of the food matrix compared with single nutrients. *Advances in Nutrition*, *10*(5), 917S-923S.

Müller, W. A., Faloona, G. R., Aguilar-Parada, E., & Unger, R. H. (1970). Abnormal alpha-cell function in diabetes: response to carbohydrate and protein ingestion. New England Journal of Medicine, 283(3), 109-115.

Munro, S., Lewin, S., Swart, T., & Volmink, J. (2007). A review of health behaviour theories: how useful are these for developing interventions to promote long-term medication adherence for TB and HIV/AIDS? BMC Public Health, 7(1), 104.

Naghashpour, M., Shakerinejad, G., Lourizadeh, M. R., Hajinajaf, S., & Jarvandi, F. (2014). Nutrition education based on health belief model improves dietary calcium intake among female students of junior high schools. Journal of health, population, and nutrition, 32(3), 420.

National Heart, L., & Institute, B. (2001). High blood cholesterol: what you need to know. Retrieved October, 6, 2002.

Nilsson, P., Gudbjörnsdottir, S., Eliasson, B., Cederholm, J., & Register, S. C. o. t. S. N. D. (2004). Smoking is associated with increased HbA1c values and microalbuminuria in patients with diabetes—data from the National Diabetes Register in Sweden. Diabetes & metabolism, 30(3), 261-268.

Noctor E, Dunne FP. Type 2 diabetes after gestational diabetes: The influence of changing diagnostic criteria. World J Diabetes. 2015 Mar 15;6(2):234-44.

Noma, K., Goto, C., Nishioka, K., Hara, K., Kimura, M., Umemura, T., . . . Chayama, K. (2005). Smoking, endothelial function, and Rho-kinase in humans. Arteriosclerosis, thrombosis, and vascular biology, 25(12), 2630-2635.

Nyenwe, E. A., Jerkins, T. W., Umpierrez, G. E., & Kitabchi, A. E. (2011). Management of type 2 diabetes: evolving strategies for the treatment of patients with type 2 diabetes. Metabolism, 60(1), 1-23.

Nyunt, S. W., Howteerakul, N., Suwannapong, N., & Rajatanun, T. (2010). Self-efficacy, self-care behaviours and glycaemic control among type-2 diabetes patients attending two private clinics in Yangon, Myanmar.

O'Connor, S., Turcotte, A. F., Gagnon, C., & Rudkowska, I. (2019). Increased dairy product intake modifies plasma glucose concentrations and glycated hemoglobin: a systematic review and meta-analysis of randomized controlled trials. Advances in Nutrition, 10(2), 262-279.

Oguntibeju, O., Truter, E., & Esterhuyse, A. (2013). The role of fruit and vegetable consumption in human health and disease prevention. Diabetes mellitus–insights and perspectives. InTech Publishers, 117-130.

Okosun, I. S., & Dever, G. A. (2002). Abdominal obesity and ethnic differences in diabetes awareness, treatment, and glycaemic control. Obesity research, 10(12), 1241-1250.

Oman Information (2020). "Geography." https://www.omaninfo.om/pages/175/show/572 (accessed 22 July, 2021).

Opie, R. S., O'Neil, A., Jacka, F. N., Pizzinga, J., & Itsiopoulos, C. (2018). A modified Mediterranean dietary intervention for adults with major depression: Dietary protocol and feasibility data from the SMILES trial. *Nutritional neuroscience*, *21*(7), 487-501.

Organization, W. H. (1998). How to evaluate the programme. World Health Organization, 133-148.

Organization, W. H. (2011a). Use of glycated haemoglobin (HbA1c) in diagnosis of diabetes mellitus: abbreviated report of a WHO consultation. Retrieved from

Organization, W. H. (2011b). Waist circumference and waist-hip ratio: report of a WHO expert consultation, Geneva, 8-11 December 2008.

Orji, R., Vassileva, J., & Mandryk, R. (2012). Towards an effective health interventions design: an extension of the health belief model. Online journal of public health informatics, 4(3).

Padaki, S., Vijayakrishna, K., Dambal, A., Ankad, R., Manjula, R., Surekharani, C., . . . Patil, S. (2011). Anthropometry and physical fitness in individuals with family history of type-2 diabetes mellitus: A comparative study. Indian Journal of Endocrinology and Metabolism, 15(4), 327.

Panagiotakos, D. B., Pitsavos, C., & Stefanadis, C. (2006). Dietary patterns: a Mediterranean diet score and its relation to clinical and biological markers of cardiovascular disease risk. Nutrition, Metabolism and Cardiovascular Diseases, 16(8), 559-568.

Pankowska, E. (2012). [The impact of dysglycemia on brain function in children with type 1 diabetes mellitus]. Med Wieku Rozwoj, 16(1), 5-9.

Patnode, C. D., Lytle, L. A., Erickson, D. J., Sirard, J. R., Barr-Anderson, D. J., & Story, M. (2011). Physical activity and sedentary activity patterns among children and adolescents: a latent class analysis approach. Journal of Physical Activity and Health, 8(4), 457-467.

Pellmar, T. C., Brandt Jr, E. N., & Baird, M. A. (2002). Health and behaviour: the interplay of biological, behavioural, and social influences: summary of an Institute of Medicine report. American Journal of Health Promotion, 16(4), 206-219.

Pereira, M. A., Jacobs Jr, D. R., Van Horn, L., Slattery, M. L., Kartashov, A. I., & Ludwig, D. S. (2002). Dairy consumption, obesity, and the insulin resistance syndrome in young adults: the CARDIA Study. Jama, 287(16), 2081-2089.

Pereira, D. A., Costa, N. M. d. S. C., Sousa, A. L. L., Jardim, P. C. B. V., & Zanini, C. R. d. O. (2012). The effect of educational intervention on the disease knowledge of diabetes mellitus patients. Revista Latino-Americana de Enfermagem, 20(3), 478-485.

Peters, M. L., Huisman, E. L., Schoonen, M., & Wolffenbuttel, B. H. R. (2017). The current total economic burden of diabetes mellitus in the Netherlands. *Neth J Med*, *75*(7), 281-297.

Petersmann, A., Muller-Wieland, D., Muller, U. A., Landgraf, R., Nauck, M., Freckmann, G., . . . Schleicher, E. (2019). Definition, Classification and Diagnosis of Diabetes Mellitus. Exp Clin Endocrinol Diabetes, 127(S 01), S1-S7.

Petersmann, A., Nauck, M., Muller-Wieland, D., Kerner, W., Muller, U. A., Landgraf, R., . . . Heinemann, L. (2018). Definition, Classification and Diagnosis of Diabetes Mellitus. Exp Clin Endocrinol Diabetes, 126(7), 406-410.

Petrie, J. R., Guzik, T. J., & Touyz, R. M. (2018). Diabetes, hypertension, and cardiovascular disease: clinical insights and vascular mechanisms. Canadian Journal of Cardiology, 34(5), 575-584.

Pham, N. M., & Eggleston, K. (2016). Prevalence and determinants of diabetes and prediabetes among Vietnamese adults. *Diabetes Research and Clinical Practice*, *113*, 116-124.

Poortinga, W. (2007). The prevalence and clustering of four major lifestyle risk factors in an English adult population. Preventive medicine, 44(2), 124-128.

Pot, G. K., Battjes-Fries, M. C., Patijn, O. N., Pijl, H., Witkamp, R. F., de Visser, M., ... & Voshol, P. J. (2019). Nutrition and lifestyle intervention in type 2 diabetes: pilot study in the Netherlands showing improved glucose control and reduction in glucose lowering medication. BMJ nutrition, prevention & health, 2(1), 43.

Pournaras, D. J., Photi, E. S., Barnett, N., Challand, C. P., Chatzizacharias, N. A., Dlamini, N. P., ... & Dhatariya, K. (2017). Assessing the quality of primary care referrals to surgery of patients with diabetes in the East of England: a multi-centre cross-sectional cohort study. *International journal of clinical practice*, *71*(7), e12971.

Psaltopoulou, T., Naska, A., Orfanos, P., Trichopoulos, D., Mountokalakis, T., & Trichopoulou, A. (2004). Olive oil, the Mediterranean diet, and arterial blood pressure: the Greek European Prospective Investigation into Cancer and Nutrition (EPIC) study. The American journal of clinical nutrition, 80(4), 1012-1018.

Rachmah, Q., Setyaningtyas, S. W., Rifqi, M. A., Indriani, D., Nindya, T. S., Megatsari, H., ... & Kriengsinyos, W. (2019). Self-efficacy to engage in physical activity and overcome barriers, sedentary behaviour, and their relation to body mass index among elderly Indonesians with diabetes. *Journal of Preventive Medicine and Public Health*, *52*(4), 242.

Raingruber, B. (2014). Health promotion theories. Contemporary health promotion in nursing practice, 53, 53-94.

Ramis, M.-A., Chang, A., Conway, A., Lim, D., Munday, J., & Nissen, L. (2019). Theory-based strategies for teaching evidence-based practice to undergraduate health students: a systematic review. BMC medical education, 19(1), 267.

Raptis, A. E., Markakis, K. P., Mazioti, M. C., Raptis, S. A., & Dimitriadis, G. D. (2011). What the radiologist needs to know about the diabetic patient. Insights into imaging, 2(2), 193-203.

Ravensbergen, H. J. C., Lear, S. A., & Claydon, V. E. (2014). Waist circumference is the best index for obesity-related cardiovascular disease risk in individuals with spinal cord injury. Journal of neurotrauma, 31(3), 292-300.

Richter, C. K., Skulas-Ray, A. C., & Kris-Etherton, P. M. (2014). Recent findings of studies on the Mediterranean diet: what are the implications for current dietary recommendations? Endocrinology and Metabolism Clinics, 43(4), 963-980.

Ried-Larsen, M., Johansen, M. Y., & Pedersen, B. K. (2017). Intensive Lifestyle Intervention for Type 2 Diabetes—Reply. JAMA, 318(24), 2494-2495.

Roden, J. (2004). Revisiting the Health Belief Model: nurses applying it to young families and their health promotion needs. Nursing & health sciences, 6(1), 1-10.

Roden, M. (2016). [Diabetes mellitus: definition, classification and diagnosis]. Wien Klin Wochenschr, 128 Suppl 2, S37-40.

Rohana, D., Norlinda, W., Azwany, Y. N., Zawiyah, D., Kamaludin, C., & Ghani, C. (2007). Economic evaluation of type 2 diabetes management at the Malaysian Ministry of Health Primary Care Clinics. Machang, Kelantan. Am J Public Health Med, 7(1), 5-13.

Roldan, C. C., Marcos, M. L. T., Marcos, F. M., Albero, J. S., Rios, R. S., Rodriguez, A. C., ... & López, P. J. T. (2019). Adhesion to the Mediterranean diet in diabetic patients with poor control. *Clínica e Investigación en Arteriosclerosis (English Edition)*, *31*(5), 210-217.

Rolland-Cachera, M. F., Akrout, M., & Péneau, S. (2015). History and meaning of the body mass index. Interest of other anthropometric measurements. The ECOG's eBook on Child and Adolescent Obesity, European Childhood Obesity Group (ECOG). Belgium.

Rosenstock, I. M. (1974). Historical origins of the health belief model. Health education monographs, 2(4), 328-335.

Rössner, S., Hammarstrand, M., Hemmingsson, E., Neovius, M., & Johansson, K. (2008). Long-term weight loss and weight-loss maintenance strategies. Obesity reviews, 9(6), 624-630.

Rubin, R. R., Peyrot, M., Gaussoin, S. A., Espeland, M. A., Williamson, D., Faulconbridge, L. F., . . . Evans-Hudnall, G. (2013). Four-year analysis of cardiovascular disease risk factors, depression symptoms, and antidepressant medicine use in the Look AHEAD (Action for Health in Diabetes) clinical trial of weight loss in diabetes. Diabetes Care, 36(5), 1088-1094.

Rumawas, M. E., Meigs, J. B., Dwyer, J. T., McKeown, N. M., & Jacques, P. F. (2009). Mediterranean-style dietary pattern, reduced risk of metabolic syndrome traits, and incidence in the Framingham Offspring Cohort. The American journal of clinical nutrition, 90(6), 1608-1614.

Saha, S., Gerdtham, U.-G., & Johansson, P. (2010). Economic evaluation of lifestyle interventions for preventing diabetes and cardiovascular diseases. International journal of environmental research and public health, 7(8), 3150-3195.

Sami, W., Ansari, T., Butt, N. S., & Ab Hamid, M. R. (2017). Effect of diet on type 2 diabetes mellitus: A review. International journal of health sciences, 11(2), 65.

Saura-Calixto, F., & Goni, I. (2009). Definition of the Mediterranean diet based on bioactive compounds. Critical reviews in food science and nutrition, 49(2), 145-152.

Schneider, S., Huy, C., Schuessler, M., Diehl, K., & Schwarz, S. (2009). Optimising lifestyle interventions: identification of health behaviour patterns by cluster analysis in a German 50+ survey. European Journal of Public Health, 19(3), 271-277.

Schwingshackl, L., & Hoffmann, G. (2015). Diet quality as assessed by the Healthy Eating Index, the Alternate Healthy Eating Index, the Dietary Approaches to Stop Hypertension score, and health outcomes: a systematic review and meta-analysis of cohort studies. Journal of the Academy of Nutrition and Dietetics, 115(5), 780-800. e785.

Scott, R. A., Lagou, V., Welch, R. P., Wheeler, E., Montasser, M. E., Mägi, R., . . . Kanoni, S. (2012). Large-scale association analyses identify new loci influencing glycaemic traits and provide insight into the underlying biological pathways. Nature genetics, 44(9), 991-1005.

Sewell, D. A., Hammersley, V. S., Robertson, A., Devereux, G., Stoddart, A., Weir, C. J., ... & Sheikh, A. (2017). A pilot randomised controlled trial investigating a Mediterranean diet intervention in pregnant women for the primary prevention of allergic diseases in infants. *Journal of Human Nutrition and Dietetics*, *30*(5), 604-614.

Shai, I., Schwarzfuchs, D., Henkin, Y., Shahar, D. R., Witkow, S., Greenberg, I., . . . Vardi, H. (2008). Weight loss with a low-carbohydrate, Mediterranean, or low-fat diet. New England Journal of Medicine, 359(3), 229-241.

Shen, J., Wilmot, K. A., Ghasemzadeh, N., Molloy, D. L., Burkman, G., Mekonnen, G., ... & Sperling, L. S. (2015). Mediterranean dietary patterns and cardiovascular health. Annual review of nutrition, 35, 425-449.

Sherwani, S. I., Khan, H. A., Ekhzaimy, A., Masood, A., & Sakharkar, M. K. (2016). Significance of HbA1c test in diagnosis and prognosis of diabetic patients. Biomarker insights, 11, BMI. S38440.

Shi, Q., Liu, S., Krousel-Wood, M., Shao, H., Fonseca, V., & Shi, L. (2018). Long-term outcomes associated with triple-goal achievement in patients with type 2 diabetes mellitus (T2DM). Diabetes research and clinical practice, 140, 45-54.

Shu, P. S., Chan, Y. M., & Huang, S. L. (2017). Higher body mass index and lower intake of dairy products predict poor glycaemic control among type 2 diabetes patients in Malaysia. PloS one, 12(2), e0172231.

Simpson, V. (2015). Models and theories to support health behaviour intervention and program planning. Health and Human Sciences, 2(8), 45-47.

Sina, M., Graffy, J., & Simmons, D. (2018). Associations between barriers to self-care and diabetes complications among patients with type 2 diabetes. *Diabetes research and clinical practice*, *141*, 126-131.

Skouroliakou, M., Grosomanidis, D., Massara, P., Kostara, C., Papandreou, P., Ntountaniotis, D., & Xepapadakis, G. (2018). Serum antioxidant capacity, biochemical profile and body composition of breast cancer survivors in a randomized Mediterranean dietary intervention study. *European journal of nutrition*, *57*(6), 2133-2145.

Slavin, J. L., & Lloyd, B. (2012). Health benefits of fruits and vegetables. Advances in nutrition, 3(4), 506-516.

Śliwińska-Mossoń, M., & Milnerowicz, H. (2017). The impact of smoking on the development of diabetes and its complications. Diabetes and Vascular Disease Research, 14(4), 265-276.

Snowdon, W., Malakellis, M., Millar, L., & Swinburn, B. (2014). Ability of body mass index and waist circumference to identify risk factors for non-communicable disease in the Pacific Islands. Obesity research & clinical practice, 8(1), e35-e45.

Spector, T., & Blake, D. (1988). Effect of cigarette smoking on Langerhans' cells. Lancet (London, England), 2(8618), 1028.

Spiegel, K., Tasali, E., Penev, P., & Cauter, E. V. (2004). Brief communication: sleep curtailment in healthy young men is associated with decreased leptin levels, elevated ghrelin levels, and increased hunger and appetite. Annals of internal medicine, 141(11), 846-850.

Steffen, L. M., Van Horn, L., Daviglus, M. L., Zhou, X., Reis, J. P., Loria, C. M., ... & Duffey, K. J. (2014). A modified Mediterranean diet score is associated with a lower risk of incident metabolic syndrome over 25 years among young adults: the CARDIA (Coronary Artery Risk Development in Young Adults) study. British journal of nutrition, 112(10), 1654-1661.

Surani, S., Brito, V., Surani, A., & Ghamande, S. (2015). Effect of diabetes mellitus on sleep quality. *World Journal of Diabetes*, *6*(6), 868.

Thanopoulou, A. C., Karamanos, B. G., Angelico, F. V., Assaad-Khalil, S. H., Barbato, A. F., Del Ben, M. P., . . . Katsilambros, N. L. (2003). Dietary fat intake as risk factor for the development of diabetes: multinational, multicenter study of the Mediterranean Group for the Study of Diabetes (MGSD). Diabetes Care, 26(2), 302-307.

Tohill, B. C., & Joint, F. (2005). Dietary intake of fruit and vegetables and management of body weight [electronic resource]: World Health Organization.

Toledo, E., Hu, F. B., Estruch, R., Buil-Cosiales, P., Corella, D., Salas-Salvadó, J., ... & Martinez-Gonzalez, M. A. (2013). Effect of the Mediterranean diet on blood pressure in the PREDIMED trial: results from a randomized controlled trial. BMC medicine, 11(1), 1-10.

Toobert, D. J., Glasgow, R. E., Strycker, L. A., Barrera, M., Radcliffe, J. L., Wander, R. C., & Bagdade, J. D. (2003). Biologic and quality-of-life outcomes from the Mediterranean Lifestyle Program: a randomized clinical trial. Diabetes Care, 26(8), 2288-2293.

Tortosa, A., Bes-Rastrollo, M., Sanchez-Villegas, A., Basterra-Gortari, F. J., Nuñez-Cordoba, J. M., & Martinez-Gonzalez, M. A. (2007). Mediterranean diet inversely associated with the incidence of metabolic syndrome: the SUN prospective cohort. Diabetes care, 30(11), 2957-2959..

Tran, N. T. T., Blizzard, C. L., Luong, K. N., Truong, N. L. V., Tran, B. Q., Otahal, P., . . . Bui, T. V. (2018). The importance of waist circumference and body mass index in cross-sectional relationships with risk of cardiovascular disease in Vietnam. PLoS One, 13(5), e0198202.

Trichopoulou, A., Costacou, T., Bamia, C., & Trichopoulos, D. (2003). Adherence to a Mediterranean diet and survival in a Greek population. New England Journal of Medicine, 348(26), 2599-2608.

Tripathy, J. P., Thakur, J. S., Jeet, G., Chawla, S., Jain, S., Pal, A., ... & Saran, R. (2017). Prevalence and risk factors of diabetes in a large community-based study in North India: results from a STEPS survey in Punjab, India. *Diabetology & metabolic syndrome*, *9*(1), 1-8.

Tuttle, K. R., Bakris, G. L., Bilous, R. W., Chiang, J. L., De Boer, I. H., Goldstein-Fuchs, J., . . . Navaneethan, S. D. (2014). Diabetic kidney disease: a report from an ADA Consensus Conference. American journal of kidney diseases, 64(4), 510-533.

UK, D. (2014). The Cost of Diabetes. In: London: Diabetes UK.

Umpierre, D., Ribeiro, P. A., Kramer, C. K., Leitao, C. B., Zucatti, A. T., Azevedo, M. J., . . . Schaan, B. D. (2011). Physical activity advice only or structured exercise training and association with HbA1c levels in type 2 diabetes: a systematic review and meta-analysis. Jama, 305(17), 1790-1799.

Umpierrez, G. E., & Kitabchi, A. E. (2001). Management of type 2 diabetes: Evolving strategies for treatment. Obstetrics and gynecology clinics of North America, 28(2), 401-420.

Vahedian Shahroodi, M., Tehrani, H., Esmaily, H., & Olyani, S. (2019). Effect of Education Intervention on Nutrition Behaviours of High School Female Students along with Promoting Health Literacy. Health Education and Health Promotion, 7(4), 1-8.

van Dam, R. M., Rimm, E. B., Willett, W. C., Stampfer, M. J., & Hu, F. B. (2002). Dietary patterns and risk for type 2 diabetes mellitus in US men. Ann Intern Med, 136(3), 201-209.

Waldeyer, C., Brunner, F. J., Braetz, J., Ruebsamen, N., Zyriax, B. C., Blaum, C., ... & Schnabel, R. B. (2018). Adherence to Mediterranean diet, high-sensitive C-reactive protein, and severity of coronary artery disease: contemporary data from the INTERCATH cohort. Atherosclerosis, 275, 256-261.

Webb, D., & Byrd-Bredbenner, C. (2015). Overcoming consumer inertia to dietary guidance. *Advances in Nutrition*, *6*(4), 391-396.

Welty, F. K. (2013). How do elevated triglycerides and low HDL-cholesterol affect inflammation and atherothrombosis? Current cardiology reports, 15(9), 400.

WHO. (2016). Global report on diabetes: executive summary. Retrieved from

WHO. (2019). Classification of diabetes mellitus.

Whole grain cooking tips - whole Grains Council (2009) *The Omani Guide to Healthy Eating - The Whole Grains Council*. Available at: https://wholegrainscouncil.org/sites/default/files/atoms/files/WGC-CookingWholeGrains_0.pdf (Accessed: January 2, 2023).

Widmer, R. J., Flammer, A. J., Lerman, L. O., & Lerman, A. (2015). The Mediterranean diet, its components, and cardiovascular disease. The American journal of medicine, 128(3), 229-238.

Winkelman JW, Schoerning L, Platt S, Jensen JE. Restless legs syndrome and central nervous system gamma-aminobutyric acid: preliminary associations with periodic limb movements in sleep and restless leg syndrome symptom severity. Sleep medicine. 2014 Oct 1;15(10):1225-30.

Wilding, J. (2014). The importance of weight management in type 2 diabetes mellitus. International journal of clinical practice, 68(6), 682-691.

Willett, W. C., Sacks, F., Trichopoulou, A., Drescher, G., Ferro-Luzzi, A., Helsing, E., & Trichopoulos, D. (1995). Mediterranean diet pyramid: a cultural model for healthy eating. The American journal of clinical nutrition, 61(6), 1402S-1406S.

Willett, W. C., Sacks, F., Trichopoulou, A., Drescher, G., Ferro-Luzzi, A., Helsing, E., & Trichopoulos, D. (1995). Mediterranean diet pyramid: a cultural model for healthy eating. The American journal of clinical nutrition, 61(6), 1402S-1406S.

Wing, R., Bolin, P., Brancati, F., Bray, G., Clark, J., Coday, M., . . . Espeland, M. (2013). Look AHEAD Research Group. Cardiovascular effects of intensive lifestyle intervention in type 2 diabetes. N Engl J Med, 369(2), 145-154.

World Health Organization (2020). Non-communicable diseases and their risk factors. STEPS Country Reports. Available from: who.int/ncds/surveillance/steps/reports/en.

World Health Organization. (2019). Classification of diabetes mellitus.

WP, S. E., Azimatun, N., Amrizal, M., Rohaizan, J., & Saperi, B. (2009). Economic burden of diabetic care in government health facilities in Selangor. Jurnal Kesihatan Masyarakat, 15, 17-26.

Wu, Y., Ding, Y., Tanaka, Y., & Zhang, W. (2014). Risk factors contributing to type 2 diabetes and recent advances in the treatment and prevention. International Journal of Medical Sciences, 11(11), 1185.

Yang, J., Farioli, A., Korre, M., & Kales, S. N. (2014). Modified Mediterranean diet score and cardiovascular risk in a North American working population. PloS one, 9(2), e87539.

Yang, F., Lv, J.-H., Lei, S.-F., Chen, X.-D., Liu, M.-Y., Jian, W.-X., . . . Yang, Y.-J. (2006). Receiver-operating characteristic analyses of body mass index, waist circumference and waist-to-hip ratio for obesity: Screening in young adults in central south of China. Clinical Nutrition, 25(6), 1030-1039.

Yang, J., Farioli, A., Korre, M., & Kales, S. N. (2014). Modified Mediterranean diet score and cardiovascular risk in a North American working population. PloS one, 9(2), e87539.

Yang, W., Zhao, W., Xiao, J., Li, R., Zhang, P., Kissimova-Skarbek, K., ... & Brown, J. (2012). Medical care and payment for diabetes in China: enormous threat and great opportunity.

Zareban, I., Karimy, M., Niknami, S., Haidarnia, A., & Rakhshani, F. (2014). The effect of self-care education program on reducing HbA1c levels in patients with type 2 diabetes. Journal of education and health promotion, 3.

Zheng, Y., Ley, S. H., & Hu, F. B. (2018). Global aetiology and epidemiology of type 2 diabetes mellitus and its complications. Nature Reviews Endocrinology, 14(2), 88.

Zhu, B., Hershberger, P. E., Kapella, M. C., & Fritschi, C. (2017). The relationship between sleep disturbance and glycaemic control in adults with type 2 diabetes: an integrative review. *Journal of clinical nursing*, *26*(23-24), 4053-4064.

Zimmerman, R. S., & Vernberg, D. (1994). Models of preventive health behaviour: Comparison, critique, and meta-analysis. Advances in medical sociology, 4, 45-67.

Zuraikat FM, Makarem N, St-Onge MP, Xi H, Akkapeddi A, Aggarwal B. A Mediterranean Dietary Pattern Predicts Better Sleep Quality in US Women from the American Heart Association Go Red for Women Strategically Focused

Research Network. Nutrients. 2020 Sep 16;12(9):2830. doi: 10.3390/nu12092830.

6. References

1) Photo in the front page, page 24 : "Designed by Freepik", website www.freepik.com.
2) American Diabetes Association, 2019. 2. Classification and diagnosis of diabetes: standards of medical care in diabetes—2019. *Diabetes care*, *42*(Supplement 1), pp.S13-S28.
3) Wing, R.R., Lang, W., Wadden, T.A., Safford, M., Knowler, W.C., Bertoni, A.G., Hill, J.O., Brancati, F.L., Peters, A., Wagenknecht, L. and Look AHEAD Research Group, 2011. Benefits of modest weight loss in improving cardiovascular risk factors in overweight and obese individuals with type 2 diabetes. *Diabetes care*, *34*(7), pp.1481-1486.
4) Al-Mawali, A., Jayapal, S.K., Morsi, M., Al-Shekaili, W., Pinto, A.D., Al-Kharusi, H., Al-Harrasi, A., Al-Balushi, Z. and Idikula, J., 2020. Prevalence of Risk Factors of Non-Communicable Diseases in the Sultanate of Oman: STEPS Survey 2017.
5) Evert, A.B., Dennison, M., Gardner, C.D., Garvey, W.T., Lau, K.H.K., MacLeod, J., Mitri, J., Pereira, R.F., Rawlings, K., Robinson, S. and Saslow, L., 2019. Nutrition therapy for adults with diabetes or prediabetes: a consensus report. *Diabetes Care*, *42*(5), pp.731-754.
6) American Diabetes Association. Standard of Medical Care 2015. 4. Foundations of care: education, nutrition, physical activity, smoking cessation, psychosocial care, and immunization. Diabetes Care 2015;38(Suppl 1):S20–30.
7) Salas-Salvadó, J., Guasch-Ferré, M., Lee, C.H., Estruch, R., Clish, C.B. and Ros, E., 2015. Protective effects of the Mediterranean diet on type 2 diabetes and metabolic syndrome. *The Journal of nutrition*, *146*(4), pp.920S-927S.
8) Evert, A.B., Boucher, J.L., Cypress, M., Dunbar, S.A., Franz, M.J., Mayer-Davis, E.J., Neumiller, J.J., Nwankwo, R., Verdi, C.L., Urbanski, P. and Yancy, W.S., 2014. Nutrition therapy recommendations for the management of adults with diabetes. *Diabetes care*, *37*(Supplement 1), pp.S120-S143.
9) Bach-Faig, A., Berry, E.M., Lairon, D., Reguant, J., Trichopoulou, A., Dernini, S., Medina, F.X., Battino, M., Belahsen, R., Miranda, G. and Serra-Majem, L., 2011. Mediterranean diet pyramid today. Science and cultural updates. *Public health* nutrition, 14(12A), pp.2274-2284.
10) Keys, A., Mienotti, A., Karvonen, M.J., Aravanis, C., Blackburn, H., Buzina, R., Djordjevic, B.S., Dontas, A.S., Fidanza, F., Keys, M.H. and Kromhout, D., 1986. The diet and 15-year death rate in the seven countries study. American journal of epidemiology, 124(6), pp.903-915.
11) Trichopoulou, A., Costacou, T., Bamia, C. and Trichopoulos, D., 2003. Adherence to a Mediterranean diet and survival in a Greek population. New England Journal of Medicine, 348(26), pp.2599-2608.
12) Estruch, R., Ros, E., Salas-Salvadó, J., Covas, M.I., Corella, D., Arós, F., Gómez-Gracia, E., Ruiz-Gutiérrez, V., Fiol, M., Lapetra, J. and Lamuela-Raventos, R.M., 2013. Primary prevention of cardiovascular disease with a Mediterranean diet. New England Journal of Medicine, 368(14), pp.1279-1290.
13) Sofi, F., Macchi, C., Abbate, R., Gensini, G.F. and Casini, A., 2014. Mediterranean diet and health status: an updated meta-analysis and a proposal for a literature-based adherence score. Public health nutrition, 17(12), pp.2769-2782.
14) Sofi, F., Cesari, F., Abbate, R., Gensini, G.F. and Casini, A., 2008. Adherence to Mediterranean diet and health status: meta-analysis. Bmj, 337.
15) Scarmeas, N., Stern, Y., Mayeux, R. and Luchsinger, J.A., 2006. Mediterranean diet, Alzheimer disease, and vascular mediation. Archives of neurology, 63(12), pp.1709-1717.
16) Gao, X., Chen, H., Fung, T.T., Logroscino, G., Schwarzschild, M.A., Hu, F.B. and Ascherio, A., 2007. Prospective study of dietary pattern and risk of Parkinson disease. The American journal of clinical nutrition, 86(5), pp.1486-1494.
17) Giugliano, D. and Esposito, K., 2008. Mediterranean diet and metabolic diseases. Current opinion in lipidology, 19(1), pp.63-68.
18) Salas-Salvadó, J., Bulló, M., Estruch, R., Ros, E., Covas, M.I., Ibarrola-Jurado, N., Corella, D., Arós, F., Gómez-Gracia, E., Ruiz-Gutiérrez, V. and Romaguera, D., 2014. Prevention of diabetes with Mediterranean diets: a subgroup analysis of a randomized trial. Annals of internal medicine, 160(1), pp.1-10.

6. References

19) Martínez-González, M.Á., Hershey, M.S., Zazpe, I. and Trichopoulou, A., 2017. Transferability of the Mediterranean diet to non-Mediterranean countries. What is and what is not the Mediterranean diet. Nutrients, 9(11), p.1226.
20) Mellor, D. and Phillips, A., 2012. A review of the current nutritional guidelines for diabetes. Practice Nursing, 23(5), pp.234-240.
21) Diabetes.org. 2021. Eating Well | ADA. [online] Available at: <https://www.diabetes.org/healthy-living/recipes-nutrition/eating-well> [Accessed 29 April 2021].
22) Intechnic, h., 2021. What is the Diabetes Plate Method?. [online] Diabetes Food Hub. Available at: <https://www.diabetesfoodhub.org/articles/what-is-the-diabetes-plate-method.html> [Accessed 1 May 2021].
23) Oldways. 2021. Search Results | Oldways. [online] Available at: <https://oldwayspt.org/recipes/search?keys=&diet%5B%5D=96&meal%5B%5D=snacks&items_per_page=12> [Accessed 1 May 2021].
24) Healthline. 2021. Mediterranean Diet 101: A Meal Plan and Beginner's Guide. [online] Available at: <https://www.healthline.com/nutrition/mediterranean-diet-meal-plan#shopping-list> [Accessed 1 May 2021].
25) Rolls, B.J., Drewnowski, A. and Ledikwe, J.H., 2005. Changing the energy density of the diet as a strategy for weight management. Journal of the American Dietetic Association, 105(5), pp.98-103.
26) Cho, S. S., Case, I. L., & Nishi, S. (2009). Fiber and Satiety. Weight Control and Slimming Ingredients in Food Technology, 227.
27) Rodgers, J. and Walker, R., 2004. Diabetes: A practical guide to managing your health. Dorling Kindersley Ltd.
28) Hinrichs, J., 2004. Mediterranean milk and milk products. European journal of nutrition, 43(1), pp.i12-i17.
29) Warburton, D.E. and Bredin, S.S., 2017. Health benefits of physical activity: a systematic review of current systematic reviews. Current opinion in cardiology, 32(5), pp.541-556.
30) Who.int. 2021. Physical activity. [online] Available at: <https://www.who.int/news-room/fact-sheets/detail/physical-activity> [Accessed 4 May 2021].
31) Ncbi.nlm.nih.gov. 2021. Table 4, Classification of Weight Status by Body Mass Index (BMI) - Endotext - NCBI Bookshelf. [online] Available at: <https://www.ncbi.nlm.nih.gov/books/NBK278991/table/diet-treatment-obes.table4clas/> [Accessed 4 May 2021].
32) Wing, R.R., Lang, W., Wadden, T.A., Safford, M., Knowler, W.C., Bertoni, A.G., Hill, J.O., Brancati, F.L., Peters, A., Wagenknecht, L. and Look AHEAD Research Group, 2011. Benefits of modest weight loss in improving cardiovascular risk factors in overweight and obese individuals with type 2 diabetes. Diabetes care, 34(7), pp.1481-1486.
33) Oldways. 2021. Search Results | Oldways. [online] Available at: <https://oldwayspt.org/recipes/search?keys=&diet%5B%5D=96&meal%5B%5D=breakfast&meal%5B%5D=lunch&meal%5B%5D=dinner&meal%5B%5D=snacks&items_per_page=12> [Accessed 5 May 2021].
34) The Mediterranean Dish. 2021. 50+ Mediterranean diet recipes you'll love!. [online] Available at: <https://www.themediterraneandish.com/best-mediterranean-diet-recipes/> [Accessed 10 May 2021].