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The Relationship between Dietary Habits and Type 2 Diabetes for Contribution to Health Promotion: Literature Review

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ABSTRACT

Introduction: Type 2 Diabetes Mellitus (T2DM) is a chronic condition largely influenced by dietary habits and eating behaviors. Poor dietary choices, such as high consumption of refined sugars, unhealthy fats, and low intake of fiber, are well-established risk factors for the development of T2DM. The promotion of healthy eating behaviours and active lifestyles is essential to address the increasing prevalence of T2DM and improve public health.

Objective: This study aimed to examine the impact of various dietary patterns and specific food intakes on the risk of T2DM, as well as the role of meal timing and dietary quality in influencing blood glucose levels and insulin sensitivity.

Method: This research employs a literature review method by analyzing several relevant studies. The articles were sourced from Scopus and Google Scholar, using keywords such as "feeding behavior," "eating behavior," "feeding patterns," "food habits," "dietary habits," and "type 2 Diabetes," "diabetes Type 2," "type 2 diabetes mellitus," "diabetes mellitus type 2," and "T2DM."

Result: The results of the article search revealed 13 articles from 2019-2024 that matched the criteria set. The results showed that Eating habits have a significant effect on the risk of developing Type 2 Diabetes Mellitus (T2DM). Poor food choices and irregular eating patterns increase the risk.

Conclusion: The paper highlights the significant impact of dietary habits and eating behaviors on the development and progression of Type 2 Diabetes Mellitus. It emphasises the importance of healthy food choices and regular eating patterns in managing blood glucose levels and insulin sensitivity. These insights could contribute to designing an effective health promotion program.

Keywords: Dietary Habits; T2DM; Eating Behavior

INTRODUCTION

The Epidemiological transition is a significant shift in the patterns of disease and death that occurs as a society develops. This transition is generally characterized by a decline in mortality rates due to infectious diseases and a rise in mortality rates from chronic diseases (1). The increasing prevalence of Non-Communicable Diseases (NCDs contributes to reduced quality of life due to its chronic nature and requires long-term management. The double burden of disease, where communicable and non-communicbale and non communicable diseases coexist. The impact of early life factors on the development of NCDs further complicates matters, so interventions must be made early to reduce long-term health impacts. Therefore, the transition to NCDs is not only changing diseases patterns but also threatening health and quality of life globally (2).

The epidemiologic transition was initially thought to be a one-way process that began with the dominance of infectious diseases and ended with the dominance of non-communicable diseases as the most common cause of death. Epidemiological transition shows changing diseases patterns, wherw chronic diseases are increasingly burdening families. This creates significant emotional and physical challenges for family caregivers who must deal with the complexities of caring for family members (3). However, it is now evident that this transition is more complex and dynamic, with diverse patterns of health and disease evolving. Non-communicable diseases are conditions that do not result from infections by microorganisms like protozoa, bacteria, fungi, or viruses. NCDs are responsible for at least 70% of death worldwide. NCDs cause death in about 41 million people each year, Approximately 17 million individuals death before reaching the age of 70 caused by NCDs, 86% of such unexpected fatalities occurred in poor and low-income countries (4).

Heart disease is the most common cause mortality in noncommunicable diseases (NCDs), with estimated 17.9 million deaths yearly. Cancer is the second most prevalent cause of death, accounting for 9.3 million deaths worldwide. Acute respiratory disorders contribute to 4.1 million deaths, followed by diabetes, which kills 2 million people. These four disease types account for more than 80% of early death from noncommunicable diseases (NCDs). Indonesian Health Survey (IHS) report explains that the prevalence of heart disease in Indonesia is 0.85% in 2023, Nationally, 1.2 per mile cancer prevalence in Indonesia by 2023, The prevalence of diabetes in all ages based on a doctor's diagnosis was 1.7%. Meanwhile, the prevalence of diabetes in the population aged ≥15 years based on a doctor's diagnosis was 2.2%, and based on blood sugar level examination, it was 11.7% (5). Smoking use, low exercise, high alcohol intake, and inadequate nutrition all increase the risk of death of NCDs, and air pollution. Diabetes mellitus is a non-communicable disease that results in high blood sugar levels due to insufficient insulin, a hormone produced by the pancreas that helps lower blood glucose. The development of diabetes is influenced by a combination of genetic and environmental factors, with T2DM accounting for over 90% of global diabetes cases (4).

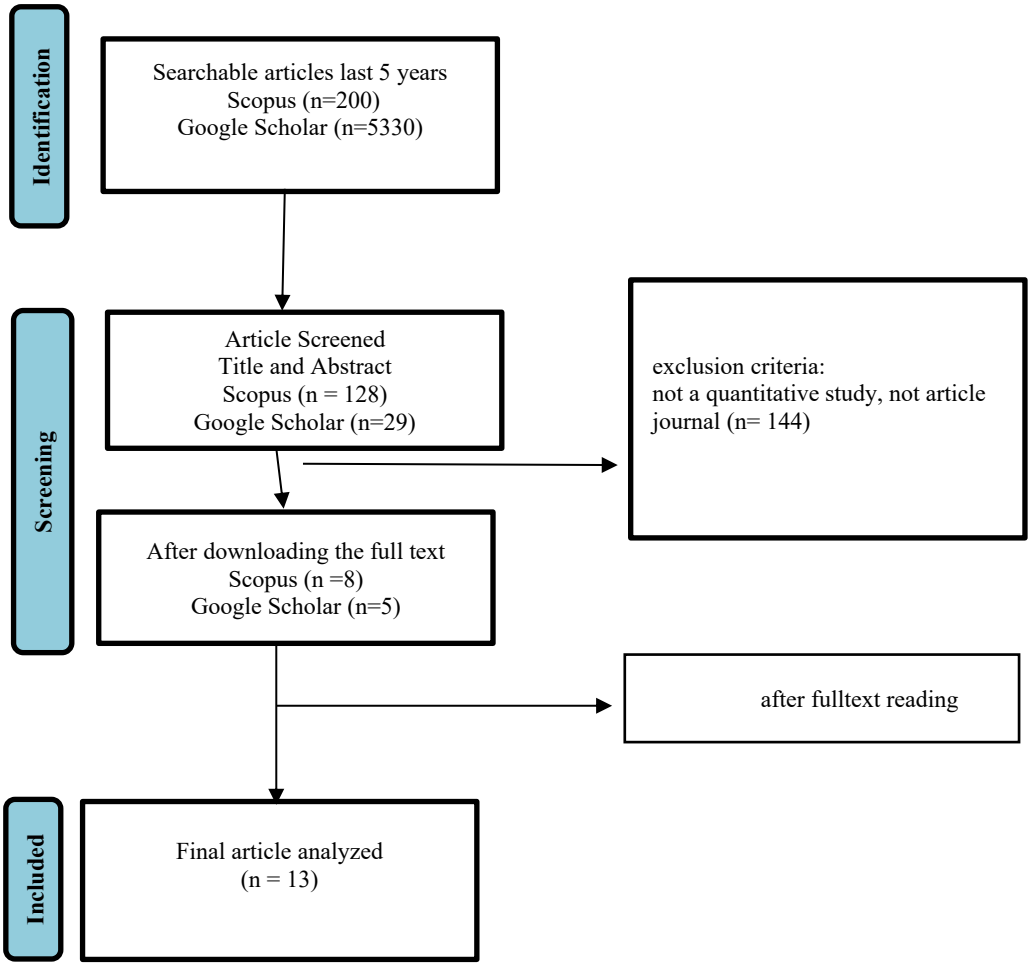
T2DM, the most common form of diabetes, is marked by elevated blood glucose levels. Glucose, which serves as the Foods is the main supply of nutrients for the body. Insulin helps glucose enter cells to be used for energy, but in T2DM, the body either doesn't Release sufficient insulin or your body will be unable to use it efficiently. The International Diabetes Federation (IDF) says that 10.5% of persons aged from 20 to 79 have diabetes, with over half of them being ignorant of their illness. According to IDF forecasts, one in every eight adults, or approximately 783 million people, will have diabetes by 2045, a 46% rise from today. More than 90% of T2DM patients are affected by demographic, socioeconomic, environmental, and genetic factors (6).

T2DM is most frequently encountered in adults over the age of 45. However, the disease is increasingly being found among children, adolescents, and younger adults attributed to increasing rates of obesity, a lack of exercise, and an energy-dense diets. The risk is higher if you have had prediabetes and gestational diabetes during pregnancy. In the last few decades, mortality rate from T2DM has steadily increased(7). It also triggers a variety of health conditions, both physical and psychologicalcoronary heart disease, kidney issues, neuropathic pain, visual loss, lower limb amputation, depression, anxiety, and mental discomfort. All of these problems considerably contribute to the high mortality and morbidity rates among patients with type 2 diabetes, put a massive cost burden on the healthcare system, and negatively impair patients' quality of life(8). Diets have undergone many changes in recent years, mainly due to increased consumption of fat and fast food, more frequent eating out, and the growth of food store chains. Diet plays an important role in a person's well-being, which may have a beneficial or negative impact on health (9). Therefore, this systematic review aims to critically assess and provide evidence based on the effect of dietary patterns on the occurrence of T2DM.

METHOD

The methodology applied in preparing this article is a Literature Review using PRISMA guidelines. The author searched for articles using the Scopus and Google Scholar databases by entering the keywords "feeding behavior" "eating behavior" "feeding patterns" "food habits" "dietary habits" and "type 2 diabetes" "type 2 diabetes mellitus" "diabetes mellitus type 2" "T2DM". For this search, the last 5 years of articles from 2019-2024 were used. The inclusion criteria of the search are articles that match the keywords, use quantitative research methods, use

articles in English, conduct research worldwide, and have full text available. Exclusion criteria are those that do not match the keywords, other than quantitative methods, articles in different languages, not available full text, or errors when downloading articles. Figure 1 shows the Prisma Flow Diagram, which depicts the article search process.



RESULTS

Review Articles

Tabel 1. Review Articles

Author	Title	Research Location	Method	Results
Iatcu, et.al (2019) (10)	Dietary Patterns in Type-2 Diabetic Patients from Norheastern Romania Dietary Patterns in Type-2 Diabetic Patients from Norheastern Romania		Case-Control	Patients with type 2 diabetes had unbalanced diets, consuming more carbohydrate-sugar, total fats, and saturated fatty acids but less fiber and polyunsaturated fats than controls, with men favoring alcoholic beverages, cereals, fish, and meat, while women consumed more milk, non-alcoholic beverages, nuts, and vegetables.
Leone, et.al (2020) (11)	Dietary Habits of Saharawi Type II Diabestic Women Living in Algerian Refugee Camps : Relationship with Nutritional Status and Glycemic Profile	Algerian	Cross-Sectional	In a study of Saharawi women with type II diabetes, 80% were overweight, with three out of four experiencing uncompensated diabetes and insulin resistance, and their diet mainly consisted of cereals, oils, sugars, vegetables, tea, and meat; principal component analysis identified two dietary

Author	Title	Research Location	Method	Results
				patterns—'healthy' and 'unhealthy'—with those following the unhealthy pattern showing higher insulin resistance and circulating insulin levels, and only 10.8% meeting glycemic targets while 75.4% had insulin resistance and 93.9% had fasting glucose levels above 126 mg/dL.
Gastélum, et.al (2021)(12)	Dietary Patterns with Healthy and Unhealthy Traits Among Overweight/Obese Hispanic Women with or at High Risk for Type 2 Diabetes	Virginia	Cross-Sectional	Six dietary patterns in overweight or obese Hispanic women at risk of T2DM include high sugar and fat consumption, plant-based foods, meat and snacks, nut, and seeds. Diet high in sugar, fat, meat and snacks tended to be consumed by younger age gropus, while plant-based foods and fish were associated with elevated fasting blood glucose levels.
Gebreyesus, et.al (2021)(13)	Eating behavior among persons with type 2 diabetes mellitus in North Ethiopia : a cross-sectional study	North Ethiopia	Cross-Sectional	In North Ethiopia, only 1% of adults with T2DM exhibited overall healthy eating behavior, while 54.4% had unhealthy eating habits. Healthy eating behaviors were observed in food selection (43.5%), meal planning (7.4%), and calorie recognition (2.9%), with factors positively associated with healthier behaviors including receiving nutrition education, being female, and being aged 26-44.
Ueno, et.al (2021)(14)	Association between Dietary Habits and Type 2 Diabetes Mellitus in Yangon, Myanmar: A Case–Control Study		Case-Control	The case group consumed more noodles, fish, beans, fermented foods, pickles, dried foods, topping seasonings, and non-dairy milk, and showed dietary habits like eating with family, skipping breakfast, and dining out frequently. Topping seasonings, low vegetable intake, and eating with family were linked to a higher diabetes risk, while consuming three or more servings of vegetables per day was inversely associated with diabetes risk, highlighting the importance of vegetable consumption for prevention.
Mahdi, et.al (2022) (15)	Dietary habits are associated with the prevalence of type 2 diabetes: a study among a middle eastern population	Middle Eastern	Cross-Sectional	Individuals consuming more than six meals per day had higher odds of T2D (OR 2.503), while greater intakes of fried foods were also significantly associated with T2D prevalence (OR 1.294).
Ali, et.al (2022) (16)	Dietary patterns among Saudis with type 2 diabetes mellitus in Riyadh: A cross-sectional study	Riyadh	Cross-sectional	Among adults in Saudi Arabia with T2DM, five dietary patterns were identified: vegetables and olive oil, grains and sweets, dairy product

Author	Title	Research Location	Method	Results
				and nuts, dates and drinks and fruit. These diets were influenced by sociodemographic and lifestyles factors, such as age, gender, smoking habits, physical activity, sncak consumption and frequency of eating out.
Elfaki, et.al (2023)(17)	Dietary patterns and their associations with glycemic control among type 2 diabetic patients in Jazan, Saudi Arabia A cross-sectional study	Jazan, Saudy Arabia	Cross-Sectional	The study revealed that fruit consumption significantly lowered HbA1c levels, while pastries and pizza consumption increased them, indicating a clear link to glycemic control. The most commonly consumed foods were bread, coffee/tea, and vegetables, while soda was the least consumed.
El-Alameey, et.al (2023)(18)	Relationship between Dietary habits, lifestyle risk factors and dysglycemia among patients with type 2 diabetes mellitus in Al Madinah Al Munawara, Saudi Arabia	Madinah	Cross-Sectional	A study of 281 type 2 diabetic patients in Al-Madinah Al-Munawara, Saudi Arabia, found that hyperglycemic females had higher rates of insufficient physical activity and sweet consumption, while dysglycemic males consumed more red meat and poultry. Significant gender differences were observed in the intake of sweets, red meat, red tea, green tea, and grains. Multinomial logistic regression revealed that sweet consumption was strongly linked to type 2 diabetes in dysglycemic females, whereas red meat was a significant predictor of dysglycemia in male type 2 diabetic patients.
Tirfessa, et.al (2023)(19)	Dietary practice and associated factors among type 2 diabetic patients attending chronic follow-up in public hospitals, central Ethiopia, 2022		Cross-Sectional	The study found that 46.1% of participants had good knowledge of diabetes, highlighting a correlation between knowledge and dietary habits. Additionally, patients with high self-efficacy, strong family support, and food-secure households were more likely to follow good dietary practices, underscoring the importance of personal and social factors in managing diabetes.
Rodriguez, et.al (2023)(20)	Association between a mediterranean lifestyle and Type 2 diabetes incidence: a prospective UK biobank study		Cohort	The study found that specific lifestyle factors such as salt consumption, limiting snacks, physical activity, sleep duration, sedentary activities, and collective sports were independently associated with a lower risk of diabetes, while napping was linked to a higher risk
Toyokuni, et. Al (2024)(21)	Eating behaviors and incidence of type 2 diabetes in Japanese people: The population-based Panasonic cohort study 15		Cohort	Skipping breakfast, fast eating, snacking after dinner, and eating before bed were linked to a higher risk of type 2 diabetes in Japanese

Author	Title	Research Location	Method	Results
				individuals with a BMI < 25 kg/m², while fast eating and late meals showed no significant association in those with a BMI ≥ 25 kg/m². No notable sex-related differences were found. Of the 128,594 participants, 6,729 developed type 2 diabetes, with adjusted hazard ratios indicating significant correlations between eating behaviors and diabetes risk.
Kalandarova, et.al(2024)(22)	Association Between Dietary Habits and Type 2 Diabetes Mellitus in Thai Adults : A Case-Control Study		Case-Control	The case group consumed more meat, beans, nuts, soft drinks, and topping seasonings, but less vegetables, fruits, fish, rice, eggs, milk products, coffee, and tea compared to the control group. Failing to remove visible fat from food and using topping seasonings were significantly linked to a higher risk of T2DM, whereas daily vegetable intake was inversely associated with T2DM risk. A high frequency of consuming deep-fried and stir-fried foods and skipping breakfast were also significantly associated with T2DM

DISCUSSION

Dietary habits and eating behaviors play a crucial role in the development and progression of T2DM. These behaviors include various factors such as the kinds of foods eaten, meal timing, portion sizes, and overall diet quality. Studies have consistently demonstrated that inadequate dietary choices and nutrient intake can notably heighten the risk of developing T2DM. Additionally, irregular meal patterns, such as skipping breakfast or consuming large meals late in the day, have been linked to impaired glucose metabolism and insulin sensitivity, further contributing to the diseases's onset.

Diet Quality and Eating Behavior

A high-quality diet, characterized by balanced nutrient intake and healthy eating behaviors, is crucial for managing T2DM. Emotional and restrained eating behaviors have been linked to poor diet quality and adverse clinical outcomes in T2DM patients. For instance, emotional eating is associated with higher vitamin C adequacy, while restrained eating correlates with fruit adequacy and lower vitamin C adequacy. The study highlights the importance of promoting healthy eating habits to improve diet quality and manage T2DM effectively(23).

Meal Patterns and Timing

Meal timing and patterns significantly affect glucose levels and variability. A prolonged eating window and late eating occasions are associated with higher glucose variability, particularly in individuals with normoglycemia. Conversely, a later eating midpoint can reduce glucose variability in those with dysglycemia. These findings suggest that meal patterns, alongside dietary composition, are modifiable factors that can influence glucose control in T2DM (24).

Dietary Patterns, Nutrient Intake, Specific Food Intakes

Certain dietary patterns, such high consumption of confectionery, chocolate, butter, and low-fiber bread is associated with an increased risk of T2DM. Conversly, diets rich in fruits and vegetables are protective against T2DM. The study emphasizes the need for dietary interventions focusing on reducing high-calorie, low nutrient foods to prevent T2DM, especially in younger populations and those with obesity(25). Poultry intake has been recognized

as a risk factor T2DM, while dried fruit and cereal intake are protective. These findings highlight the causal effects of specific food items on T2DM risk, suggesting dietary modifications as a preventive (26).

Geographical and Cultural Influences

In low-income middle country like India, dietary practices vary significantly across regions, with urban populations consume more carbohydrates. This transition towards calorie dense foods at the expense of food diversity may contribute to the rising incidence of T2DM. T2DM is influenced by various cultural factors, although no particular culture is exclusively associated with the disease. However, certain practices, beliefs and lifestyles may increase the risk or create unique challenges in its management. Traditional diets high in refined carbohydrates, sugar and unhealty fats, as well as large portion sizes, can increase the risk of T2DM, especially in communities in South Asia, the middle East and Latin America. Sedentary lifestyles, often due to urbanization and job changes, also increase the prevelance of diabetes, especially in developing countries(27). Cultural beliefs about the causes and treatment of T2DM, including alternative therapies, may influence a person's willingness to seek appropriate medical care. The stigma attached to diabetes in some cultures may also hinder disclosure of the condition and adherence to treatment. Strong social support and family dynamics, whilw helpful, can aslso create pressure to follow certain unhealthy eating habits. Limited access to healthcare, diabetes education anda medications, especially in low-middle-income countries, further complicates the management of the disease(28). Therefore, cultural factors such as diet, lifestyle, health beliefs, and social dynamics greatly influence the prevelance and management of t2DM in various population. Public health strategies focusing on diet and lifestyle modifications are essential to address these regional dietary disparities and prevent T2DM. While the studies provide valuable insights into the dietary factors influencing T2DM, it is important to consider individual variability and cultural contexts when designing dietary interventions. Further research is needed too explore the mechanisms underlying these associations and to develop tailored dietary guidelines for T2DM prevention and management(29).

CONCLUSION

The paper concludes that dietary habits are crucial in both the development and prevention of Type 2 Diabetes Mellitus (T2DM). poor dietary choices, such as high consumption of processed foods, refined sugars, and unhealthy fats, along with low fiber and nutrient intake, increase the risk of T2DM. In contrast, healthier dietary patterns, including a high intake of fruits and vegetables are linked to a reduced risk. Irregular meal patterns, like skipping breakfast or eating large meals late in the day, contribute to impaired glucose metabolism and insulin sensitivity, further increasing T2DM risk. The findings emphasize adopting healthier eating behaviors, including increased fruit and vegetebale consumption and mindful meal timing, as preventive measures. Public Health strategies promoting healthy dietary habits could reduce T2DM incidence, alleviate healthcare burdens, and improve life quality for those at risk or living with diabetes. Overall, the paper underscores the importance of dietary habit modification in managing and preventing T2DM, with significant implications for individual and public health.

REFERENCES

1. McKeown RE. The Epidemiologic Transition: Changing Patterns of Mortality and Population Dynamics. NIH Public Access. 2010;3:1–14.
2. Singhal A. The global epidemic of noncommunicable disease: The role of early-life factors. Nestle Nutr Inst Workshop Ser. 2014;78:123–32.
3. King EM, Randolph HL, Floro MS, Suh J. Demographic, health, and economic transitions and the future care burden. World Dev [Internet]. 2021;140:105371. Available from: https://doi.org/10.1016/j.worlddev.2020.105371
4. WHO. Noncommunicable diseases [Internet]. 2023. Available from: https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases
5. Kemenkes RI. Survei Kesehatan Indonesia 2023 [Internet]. Kementerian Kesehatan RI. 2023. Available from: https://www.badankebijakan.kemkes.go.id/ski-2023-dalam-angka/
6. International Diabetes Federation. IDF Diabetes Atlas. 2021.
7. Ahmad E, Lim S, Lamptey R, Webb DR, Davies MJ. Type 2 diabetes. Lancet [Internet]. 2022 Nov 19;400(10365):1803–20. Available from: https://www.proquest.com/scholarly-journals/type-2-diabetes/docview/2737397530/se-2?accountid=17242
8. Garg P, Duggal N. Type 2 diabetes mellitus , its impact on quality of life and how the disease can be managed-a review. 2022;35(September).
9. Sabbagh C, Etiévant P. Dietary behaviours and practices: Determinants, action, outcomes . OCL - Ol Corps Gras Lipides [Internet]. 2012;19(5):261–9. Available from: https://www.scopus.com/inward/record.uri?eid=2-s2.0-

84868239467&doi=10.1684%2Focl.2012.0468&partnerID=40&md5=cd0aca0528d30239358f12a0cd8790ae
10. Iatcu CO, Cosman L, Dimian M, Covasa M. Dietary patterns in type-2 diabetic patients from norheastern Romania. 2019 7th E-Health Bioeng Conf EHB 2019. 2019;3–6.
11. Leone A, Battezzati A, Di Lello S, Ravasenghi S, Mohamed-Iahdih B, Saleh SML, et al. Dietary habits of Saharawi type II diabetic women living in Algerian refugee camps: Relationship with nutritional status and glycemic profile. Nutrients. 2020;12(2):1–16.
12. Arias-Gastélum M, Lindberg NM, Leo MC, Bruening M, Whisner CM, Der Ananian C, et al. Dietary Patterns with Healthy and Unhealthy Traits Among Overweight/Obese Hispanic Women with or at High Risk for Type 2 Diabetes. J Racial Ethn Heal Disparities [Internet]. 2021 Apr;8(2):293–303. Available from: https://www.proquest.com/scholarly-journals/dietary-patterns-with-healthy-unhealthy-traits/docview/2933491236/se-2?accountid=17242
13. Gebreyesus HA, Abreha GF, Besherae SD, Abera MA, Weldegerima AH, Kidane EG, et al. Eating behavior among persons with type 2 diabetes mellitus in North Ethiopia: a cross-sectional study. BMC Endocr Disord. 2021 May;21(1):99.
14. Ueno S, Aung MN, Yuasa M, Ishtiaq A, Khin ET, Latt TS, et al. Association between Dietary Habits and Type 2 Diabetes Mellitus in Yangon, Myanmar: A Case-Control Study. Int J Environ Res Public Health. 2021 Oct;18(21).
15. Mahdi S, Mazidi M, Davies IG, Beigrezaei S, Mozaffari-Khosravi H, Mirzaei M, et al. Dietary habits are associated with the prevalence of type 2 diabetes: a study among a middle eastern population. J Nutr Sci. 2022;11:e78.
16. Ali A, Id A, Mohammed N, Id B, Aljahdali AA, Bawazeer NM. Dietary patterns among Saudis with type 2 diabetes mellitus in Riyadh: A cross-sectional study. PLoS One [Internet]. 2022 May;17(5):1–13. Available from: https://www.proquest.com/scholarly-journals/dietary-patterns-among-saudis-with-type-2/docview/2686208319/se-2?accountid=17242
17. Elfaki FA, Chandika RM, Kahlani SH, Hakami HH, Hakami AS, Alsayegh AA, et al. Dietary patterns and their associations with glycemic control among type 2 diabetic patients in Jazan, Saudi Arabia: A cross-sectional study. Med (United States) [Internet]. 2023;102(28):E34296. Available from: https://www.scopus.com/inward/record.uri?eid=2-s2.0-85164844260&doi=10.1097%2FMD.0000000000034296&partnerID=40&md5=4b40492a817f2b04bfd32715912b917d
18. El-alameey IR, Al-aswad WA, Khojah RM. Relationship between Dietary habits , lifestyle risk factors and dysglycemia among patients with type 2 diabetes mellitus in Al Madinah Al Munawara , Saudi Arabia. 2023;16(September):1405–14.
19. Tirfessa D, Abebe M, Darega J, Aboma M. Dietary practice and associated factors among type 2 diabetic patients attending chronic follow-up in public hospitals, central Ethiopia, 2022. BMC Health Serv Res [Internet]. 2023;23(1):1–13. Available from: https://www.proquest.com/scholarly-journals/dietary-practice-associated-factors-among-type-2/docview/2902113351/se-2?accountid=17242
20. Maroto-Rodriguez J, Ortolá R, Carballo-Casla A, Iriarte-Campo V, Salinero-Fort MÁ, Rodríguez-Artalejo F, et al. Association between a mediterranean lifestyle and Type 2 diabetes incidence: a prospective UK biobank study. Cardiovasc Diabetol [Internet]. 2023;22(1):1–10. Available from: https://www.proquest.com/scholarly-journals/association-between-mediterranean-lifestyle-type/docview/2877498616/se-2?accountid=17242
21. Toyokuni E, Okada H, Hamaguchi M, Nishioka N, Tateyama Y, Shimamoto T, et al. Eating behaviors and incidence of type 2 diabetes in Japanese people: The population-based Panasonic cohort study 15. J Diabetes Investig [Internet]. 2024 Aug 1;15(8):1017–25. Available from: https://www.scopus.com/inward/record.uri?eid=2-s2.0-85189773697&doi=10.1111%2Fjdi.14207&partnerID=40&md5=e2f4c0eb69f1702abc778901304deadd
22. Kalandarova M, Ahmad I, Nyein T, Aung N, Moolphate S, Shirayama Y, et al. Association Between Dietary Habits and Type 2 Diabetes Mellitus in Thai Adults : A Case-Control Study. 2024;(February):1143–55.
23. Gal AM, Arhire LI, Gherasim A, Graur M, Nita O, Dumitrascu O, et al. Association between Diet Quality and Eating Behavior in Type 2 Diabetes Adults: A Cross-Sectional Study. Nutrients [Internet]. 2024;16(13):2047. Available from: https://www.proquest.com/scholarly-journals/association-between-diet-quality-eating-behavior/docview/3079130745/se-2?accountid=17242
24. Santos–Báez LS, Garbarini A, Shaw D, Cheng B, Popp CJ, Manoogian ENC, et al. Time-restricted eating to improve cardiometabolic health: The New York time-restricted eating randomized clinical trial – Protocol overview. Contemp Clin Trials [Internet]. 2022;120. Available from:

https://www.scopus.com/inward/record.uri?eid=2-s2.0-85135699226&doi=10.1016%2Fj.cct.2022.106872&partnerID=40&md5=3640f2ecf159b2c0c31d518a827c756f

25. Gao M, Jebb SA, Aveyard P, Ambrosini GL, Perez-Cornago A, Papier K, et al. Associations Between Dietary Patterns and Incident Type 2 Diabetes: Prospective Cohort Study of 120,343 UK Biobank Participants. Diabetes Care. 2022;45(6):1315–25.
26. Wang P, Tan Q, Zhao Y, Zhao J, Zhang Y, Shi D. Night eating in timing, frequency, and food quality and risks of all-cause, cancer, and diabetes mortality: findings from national health and nutrition examination survey. Nutr Diabetes [Internet]. 2024;14(1):5. Available from: https://www.proquest.com/scholarly-journals/night-eating-timing-frequency-food-quality-risks/docview/2932317078/se-2?accountid=17242
27. Yuan S, Li X, Liu Q, Wang Z, Jiang X, Burgess S, et al. Physical Activity, Sedentary Behavior, and Type 2 Diabetes: Mendelian Randomization Analysis. J Endocr Soc [Internet]. 2023;7(8):1–8. Available from: https://doi.org/10.1210/jendso/bvad090
28. Omodara DA, Gibson L, Bowpitt G. Exploring the impact of cultural beliefs in the self-management of type 2 diabetes among Black sub-Saharan Africans in the UK–a qualitative study informed by the PEN-3 cultural model. Ethn Heal [Internet]. 2022;27(6):1358–76. Available from: https://doi.org/10.1080/13557858.2021.1881764
29. Sachdev M, Misra A. Heterogeneity of Dietary practices in India: current status and implications for the prevention and control of type 2 diabetes. Eur J Clin Nutr [Internet]. 2023 Feb;77(2):145–55. Available from: https://www.proquest.com/scholarly-journals/heterogeneity-dietary-practices-india-current/docview/2774364645/se-2?accountid=17242