



Level of Knowledge, Physical Activity and Dietary Behaviour of Type 2 Diabetics at the Abidjan Diabetes Center

**Kouassi Jean-Paul ^{a*}, Kouamé N'Guessan ^a,
Sinh Josi-Noelline ^a, Disseka Paterson Valery ^a,
N'Zué Sandrine ^a, Gouthon GilChrist ^b, Linta Léonce ^b
and Brou Yapi Axel ^a**

^a *Laboratory for the Science of Human Movement, Development and well-being Injs, Abidjan, Cote d'ivoire.*

^b *Sport, Health and Evaluation Research Unit, INEPS, Porto, Novo, Benin.*

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aims: Type 2 diabetes, commonly known as diabetes mellitus, is a major public health problem due to its prevalence worldwide. This chronic disease is the 9th leading cause of death worldwide. However, in addition to medical treatment, its management requires appropriate hygienic and dietary measures, in particular a suitable diet and regular physical activity. The aim of this study was to assess the level of knowledge and practice of physical activity and the quality of the diet of diabetics at the Abidjan Anti-diabetic Center (CADA).

*Corresponding author: Email: kouassijp@yahoo.fr, kouassijp1@yahoo.fr;

Methodology: This study was a survey with 50 diabetics of CADA. A questionnaire sheet served as a data collection tool to research the level of knowledge and practice of physical activity as well as the quality of the diet of the respondents.

Results: The results showed that the sample included 38 women (76%) and 12 men (24%) aged between 33 and 75 years. 70% of the respondents had been ill for at least 5 years. The results also showed that 48 (96%) diabetics had a low level of general knowledge of physical activity. Before the diagnosis of diabetes, 45 respondents (90%) had a low level of physical activity. After diagnosis, 37 diabetics (74%) had a low level of physical activity. The results also showed that the proportion of diabetics with a good level of physical activity after the diagnosis of diabetes was statistically higher ($p < 0.05$) than the proportion of diabetics with a good level of physical activity before the disease. With regard to diet quality, the results show that all patients (100%) had a poor diet quality before the diagnosis of diabetes. After being declared diabetic, only 6% of diabetics surveyed had a good quality diet.

Conclusion: It is important to conduct information and awareness-raising campaigns among the general population, and especially among diabetics, on the importance of hygienic-dietary measures, i.e. a suitable diet and regular exercise.

Keywords: Diabetes; diet; physical activity; health and diet measures.

1. INTRODUCTION

Diabetes is a metabolic disorder that occurs when the body is unable to produce enough insulin or use insulin effectively [1]. It is characterized either by a state of chronic hyperglycaemia or by fasting blood glucose levels above 1.26 g/L (7mmol/L) or above 2 g/L at any time of testing [2].

Although there are different forms of diabetes, the best known are type 1 diabetes and type 2 diabetes [3] [1]. Type 1 diabetes (T1DM) is caused by a deficiency in insulin secretion [4]. Type 2 diabetes (T2DM), also known as adult-onset diabetes or diabetes mellitus [4], is caused by a relative deficiency in insulin production or poor use of this hormone by the body as a result of insulin resistance [5]. It is closely linked to unhealthy lifestyle habits, mainly inappropriate diet and a sedentary lifestyle, which predispose to obesity [6] [7]. T2DM affects around 90% to 95% of the diabetic population [8] [9].

If not managed effectively, this disease can lead to complications. It is the leading cause of kidney failure in all Western countries, a third of the causes of myocardial infarction, the leading cause of obliterative arteriopathy of the lower limbs and a major cause of stroke and blindness [10-12]. In Africa, particularly in Côte d'Ivoire, diabetes is a chronic disease that is difficult to manage and often leads to complications [12]. It is therefore a major public health problem [2].

In Côte d'Ivoire, diabetes is generally managed by prescribing medication. However, people with

T2DM seem unaware that regular physical exercise and a balanced diet are necessary for better control of the disease. Yet the adoption of hygienic dietary measures, such as regular physical activity and a balanced diet, can contribute to better control of diabetes [13,14]. That's why those practices are recommended for diabetics [15]. As a result, it would be easier for patients to adopt a healthy diet and engage in regular physical activity if they were aware of the benefits for their health.

The aim of this study is to determine the level of knowledge and practice of physical activities and the quality of diet among type II diabetic patients at the CADA (Abidjan Anti-Diabetic Center).

2. MATERIALS AND METHODS

2.1 Type of Study

This cross-sectional study was conducted in the form of a questionnaire survey from 1 to 30 September 2021 among diabetics at the CADA.

2.2 Participants

Fifty (50) type 2 diabetics regularly treated at CADA in 2021 took part in this survey. The sample was determined by the non-random method and the accidental technique. All type 2 diabetics seen at CADA who had given written informed consent, after having been informed of the objectives of the study, were included in the sample. All diabetics with renal complications and pregnant women with type 2 gestational diabetes were not included.

2.3 Data Collection Protocol

The data was collected using a questionnaire. This questionnaire was pre-tested with 20 diabetics from CADA who were not part of the sample. As a result, 11 questions were modified to ensure that the meaning was the same for everyone. The questionnaire was administered directly to the respondents by the principal researcher.

2.3.1 Data collection tool

A 50-question questionnaire consisting of four parts was drawn up. The first concerned socio-demographic characteristics (seven questions) and diabetes history (2 questions). The second part dealt with general knowledge of physical activity (8 questions). The third part concerned the level of physical activity (11 questions) and the last part concerned the quality of diet before (11 questions) and after (11 questions) being diagnosed with diabetes.

2.4 Variables

This study took into account three main composite variables. These were "level of knowledge of physical activity", "level of physical activity" and "quality of diet of diabetics". The level of knowledge of physical activity included dimensions relating to the definition of physical activity and the benefits of physical activity. The level of physical activity was assessed by examining the level of activity before and after being declared diabetic. Diet quality was also assessed along two dimensions: diet quality before and after being diagnosed with diabetes. The elderly people studied had a good diet when they regularly ate three meals a day, ate fruits and vegetables every day, did not snack between meals, had a good protein intake and did not consume fizzy drinks. The level of physical activity was good when the subject performed 30 minutes of moderate-intensity physical activity at least three times a week. Each variable and the dimensions were dichotomised into good and poor modes. The questions were evaluated in two ways: "good and bad" or "true and false", as appropriate.

2.5 Statistical Analysis

The data were analysed using SPSS version 21. The results were presented in the form of numbers and percentages. The Chi 2 test was used to compare proportions. The significance level was set at $p < 0.05$.

3. RESULTS AND DISCUSSION

3.1 Results

3.1.1 Socio-Demographic characteristics of respondents

The results of this study showed that the sample comprised 38 women (76%) and 12 men (24%) aged between 33 and 75. Respondents who had been ill for at least 5 years numbered 35 and represented 70% of the sample. Civil servants and retired people accounted for 5 (10%) and 9 (18%) of diabetic patients respectively. The others (shopkeepers, farmers, housewives, unemployed) accounted for 36 diabetics (72%). Married patients (20) accounted for 40% of those surveyed. Divorced, single and widowed people (30) accounted for 60% of those surveyed. The survey revealed that 14% of diabetics had a higher level of education, 13 (26%) a secondary level of education, 20 (40%) a primary level of education and 10 (20%) were out of school (Table 1).

3.1.2 General level of knowledge of physical activity and sport

The results show that only 2 (4%) diabetics had a good level of general knowledge of physical activity (Table 2). Consequently, 44 (88%) diabetics did not have a good level of definition of physical activity and 34 (68%) of those surveyed did not know the importance of practicing physical activity (Table 2).

3.1.3 History of physical activity practice for diabetics

The results showed that the level of physical activity before and after being diagnosed with diabetes was good in 10% and 26% respectively of the diabetics surveyed (Fig. 1). The proportion (Fig. 1) of diabetics with a good level of physical activity after diagnosis of the disease was statistically higher than the proportion of those who had a good level of physical activity before diagnosis of diabetes ($P < 0.001$).

3.1.4 Diet quality before and after diabetes status

The results show that all patients (100%) had a poor quality diet before being diagnosed with diabetes. After being declared diabetic, only 6% of diabetics surveyed had a good quality diet (Table 3).

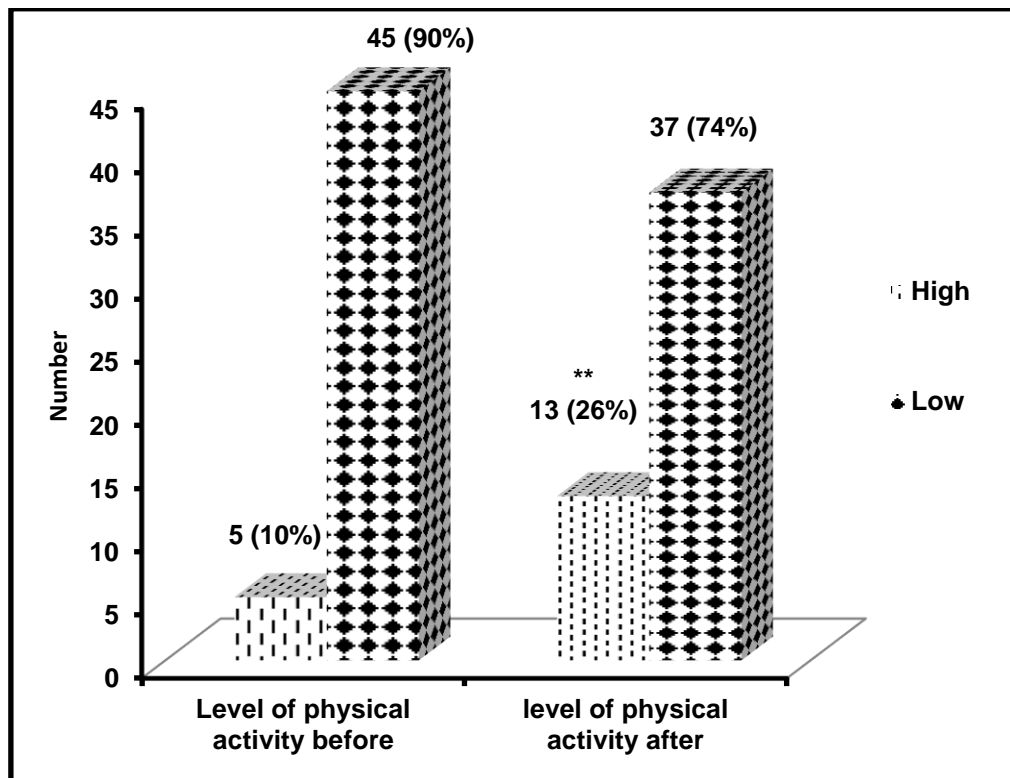


Fig. 1. Level of physical activity before and after diagnosis of diabetes

** : Difference with previous measurement, significant at $P < 0.001$

Table 1. Sample breakdown by socio-demographic characteristics

Variables		Numbers	Pourcentages (%)
Gender	Male	12	24%
	Female	38	76%
Age	Under 40	4	8%
	40- 60 ans	27	54%
	60 and over	19	38%
Profession	Civil servant	24	48%
	Business	14	28%
	Retired	12	24%
Marital status	Maried	20	40%
	Single	14	28%
	Divorced	2	4%
	Widowed	14	28%
Living area	Urban	41	82%
	Rural	9	18%
Education level	Noschooling	10	20%
	Primary	20	40%
	Secondary	13	26%
	Highereducation	7	14%
Duration of diabetes	2-5 years	15	30%
	5-15years	22	44%
	15-30 years	13	26%

Table 2. Responses relating to general knowledge of physical activity

		Definition of physical activity and sport	Importance of physical activity and sport	Level of general knowledge of physical activity and sport
		Number (%)	Number (%)	Number (%)
Level	High	6(12%)	16 (32%)	2 (4%)
	Low	44 (88%)	34 (68%)	48 (96%)

%: Percentage

Table 3. Quality of diet before and after the diagnosis of diabetes

		Diet before diagnosis	Diet after diagnosis
		Number (%)	Number (%)
Level	High	0 (0%)	3 (6%)
	Low	50 (100%)	47 (94%)

% : Percentage

3.2 DISCUSSION

The aim of this study was to determine the level of knowledge and practice of physical activities and the quality of their diet among type II diabetic patients at the Abidjan Anti-Diabetic Centre (CADA). The data collection tool used in this study was validated by researchers at the INJS in Abidjan, who are experienced in CAP study techniques and specialize in nutrition and assessing physical activity levels. A pre-test was also carried out to validate the tool. All these precautions ensured that the study was highly reliable and valid.

3.2.1 Socio-demographic distribution of diabetics

The results showed that the diabetics studied came from all social strata and all walks of life (rural and urban), thus demonstrating that the disease affects everyone, regardless of social stratum, professional level, education, etc. Diabetes has thus become a public health issue in Côte d'Ivoire [16,17]. The increasing prevalence and incidence of the disease in the country and the consequences of the disease are clear evidence of this. It has been well documented in Côte d'Ivoire that the disease is responsible for high morbidity [16,17]. This situation is exacerbated by the fact that the majority of the population, as shown by the sample in this study, has a low level of income. In Côte d'Ivoire, medical care for diabetes represents 70 to 96% of the budget of low-income families and 25 to 55% of the budget of middle-income families [18]. This is why it is necessary to detect the disease early in order to promote effective management while minimizing costs. Ideal management of the disease requires

not only medical care but also compliance with hygienic and dietary measures, namely a healthy diet [13,14] and regular physical activity [19]. Regular physical activity is also a good non-drug alternative [20] because it does not always require a financial outlay and is effective in combating diabetes and other metabolic diseases.

3.2.2 General level of knowledge of physical activity and sport

Despite the importance of physical activity in the management of diabetes, the present study revealed that the diabetics studied had little knowledge of physical activity. In fact, this study revealed that the participants did not really know what physical activity was. This low level of knowledge of physical activity is reflected in a lack of awareness of its importance in maintaining good health in general and in the management of diabetics. In fact, a good level of knowledge can influence the level of practice [21]. If people are aware of the importance of something, it is highly likely that they will adopt the right behaviour. One study showed that mothers who had a good knowledge of malaria adopted good behaviour, such as taking their children to hospital at the first sign of malaria [22]. Irrespective of intellectual level or social background, the diabetics in this study are not really familiar with physical activity and its implications for diabetic health. Although diabetes is a public health problem, it is less common than malaria and affects fewer people. What's more, malaria can cause death more quickly if left untreated in newborns, children and adults. Information on diabetes is not as common as that on malaria (a disease for which regular information and awareness campaigns are

organized). In addition, information on the importance of physical activity in the management of diabetes is not as widely available as for malaria. As a result, the level of knowledge about physical activity among diabetics in this study is low. However, it is essential to note that knowledge of the importance of physical activity in patients with type 2 diabetes is a key factor in effective disease management [15].

In contrast to the present study, Fjeldsoe et al. [23] found in their work that patients were aware of the importance of physical activity, however, they did not always understand how to integrate it effectively into their daily routine. For this reason, Eves and Plotnikoff [24] emphasized that knowledge alone is not enough to change behaviour, and that more comprehensive education and ongoing support are needed to ensure that people behave as they should. The results of the present study highlight the need to improve type 2 diabetes patients' knowledge of the importance of physical activity in managing their diabetic condition, relying mainly on the medical profession.

3.2.3 Level of physical activity

In addition to the low level of knowledge about physical activity, the results also highlighted the low level of physical activity among the subjects studied before and after the diagnosis of diabetes. The absence of any change in behaviour was noted, despite CADA's promotion of regular physical activity as a support for drug treatment. In fact, it has been observed that habits established before diagnosis can considerably influence behaviour after diagnosis. According to a study by Yates et al [25], patients who had an established regular physical activity routine prior to diagnosis were more likely to maintain this routine after diagnosis. However, those who did not have a history of regular physical activity had more difficulty integrating exercise into their daily lives, as was found in the present study.

This low level of physical activity can be explained by the low level of knowledge previously observed, the lack of motivation and the low level of practice in the general population. Low levels of physical activity run the risk of complications and worsening of diabetes in the patients studied. For this reason, it is recommended that diabetics engage in regular physical activity. Regular physical activity

improves cardiorespiratory health and increases physical fitness (by increasing endurance and muscular flexibility). Physical activity also improves glycaemic control by reducing insulin resistance and improving the lipid profile. Physical activity also helps to reduce blood pressure and maintain or lose body mass [26,27], as well as improving glycated haemoglobin (HbA1C) values [28,29].

However, it was observed that the proportion of diabetics practising physical activity after diagnosis of the disease was statistically higher than the proportion of those practising physical activity before diagnosis. This increase in the proportion can be explained by the action taken by medical staff (doctors, nurses, etc.) in managing the disease. At CADA, these staff do not hesitate to urge patients to engage in regular physical activity, explaining the effects and health benefits. It is therefore very important to train medical staff on issues relating to non-drug treatment, particularly physical activity, in order to encourage more patients to engage in regular physical activity. In addition, this health service has set up a physical activity program available to patients.

In view of the benefits of physical activity, it would be useful to set up physical activity programs not only for diabetics but also for the whole population in order to encourage regular physical activity. To this end, at least three sessions of aerobic exercise lasting at least 30 minutes are recommended for type 2 diabetics [29]. This activity can be achieved simply by increasing the number of steps taken each day, with an increase of 2.000 steps per day providing very significant results [30]. It is also recommended that nutritional monitoring be added to physical activity[13].

3.2.4 The quality of diabetics' diets

The study conducted at the Abidjan Diabetes Center (CADA) revealed that most type 2 diabetes patients had an unbalanced diet prior to their diagnosis. Many of them regularly ate foods high in added sugars, saturated fats and salt, which contributed either to excessive body weight gain or poor management of their blood sugar levels. This unhealthy diet was often associated with a lack of knowledge about appropriate food choices for type 2 diabetics. This situation is exacerbated by the fact that the diet in Côte d'Ivoire is essentially based on foods with a very high glycaemic index [31]. In

particular, these foods contain a very high proportion of carbohydrates per 100g. These foods include attiéké (96.10%), attoukpou (95.68%), placali (95.90%), cabatoh (59.99%), yam (63.11%) and rice (57.55%) [31].

However, carbohydrate tolerance for diabetic subjects does not exceed 40 g of carbohydrate per day, whereas the diet in Côte d'Ivoire provides around 180 g of carbohydrate per day [31], i.e. an excess of 140 g. This eating diet could encourage the onset of diabetes, or make it difficult to manage diabetes in people who have already been diagnosed.

In contrast to the observations made in the present study, the works of Sabarathinam [32] and Chiu et al. [33] showed that many diabetic patients changed their diet after being diagnosed. They gave greater priority to foods with a low glycaemic index. However, it is often difficult for patients to maintain this change over the long term because of pre-existing eating habits, cultural influences relating to the hedonic aspect of food and the financial constraints imposed by this new eating pattern [34].

It is therefore essential to provide type 2 diabetes patients with appropriate nutritional information and advice to help them improve the quality of their diet in addition to regular physical activity.

4. CONCLUSION

This study showed that diabetics treated at the Abidjan Anti-diabetes Centre (CADA) have a low level of knowledge of physical activity and practice, and a poor quality diet. In view of the social consequences of diabetes, it is imperative to set up awareness programs on the non-drug management of diabetes, through a suitable diet and regular physical activity, which are essential hygiene and dietary measures.

CONSENT

As per international standards or university standards, Participants' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Tenenbaum M, Bonnefond A, Froguel P, Abderrahmani A. Pathophysiology of diabetes. French-speaking Laboratories Review. 2018; 2018(502): 26-32.
2. Bellil I, Barkat ML, Khelifi D. Preliminary investigation of diabetes markers in human saliva. JAM. 2015;XXIII(1): 3-7.
3. Leroy C, Gueorguieva I. MODY type diabetes: when to mention it in children? Medicine of Metabolic Diseases. (2020);14(5): 408-416.
4. American Diabetes Association. Diagnosis and clarification of diabetes mellitus. Diabetes Care. 2010;33(S1):S62-S69.
5. Sinclair AJ, Rodriguez-Mañas L. Diabetes and frailty: two converging conditions? Canadian journal of diabetes. 2016; 40(1): 77-83.
6. Fern É. Diet and diabetes. Pharmaceutical News. 2021;60(602):57-58.
7. Sicard J. Advances in the management of diabetes. Pharmaceutical News. 2017; 56(569):39-43.
8. Halimi S, Lévy M. Management of type 2 diabetic patients during Ramadan: what place for DPP-4 inhibitors? Metabolic Disease Medicine. 2014;8(3):299-305.
9. Rigalleau V, Lang J, Gin H. Etiology and pathophysiology of type 2 diabetes. Endocrinology-Nutrition. 2007; 10:10-366.
10. Pálsson R, Patel UD. Cardiovascular complications of diabetic kidney disease. Advances in Chronic Kidney Disease. 2014; 21(3):273-80.
11. Koki G, Bella AL. Diabetic retinopathy in black Africans. Health Notebooks. 2010;20(3).
12. Drabo YJ, Kaboré J, Lengani A. Complications of diabetes mellitus at the Ouagadougou hospital center. Bull Soc Path Ex. 89: 191-5. English
13. Koné B. Food security and urban health in sub-Saharan Africa: Influence of diet on the prevalence of diabetes mellitus in Abidjan (Ivory Coast). Space, Territories, Societies and Healthreview. 2020;3(5): 143-155.
14. Aké-Tano SOP, Ekou FK, Konan YE, Tetchi EO, Kpebo DO, Sable SP et al. Dietary practice of type 2 diabetics followed at the Antidiabetic Center of Abidjan. Africa, Public Health & Development. 2017;29(3):423-30.

15. Duclos M, Oppert JM, Vergès B, Coliche V, Gautier JF, Guezennec CY, Reach G et al. Physical activity and type 2 diabetes: Framework of the French-speaking Diabetes Society (SFD). *Metabolic Disease Medicine*. 2012;6(1):80-96.
16. Konan EY, Tetchi EO, Kokora EF, Gilbert KL, Odile TA. Profile of 20 to 79 years from the national survey on the prevalence and characteristics of diabetes in Côte d'Ivoire. *African Journal of Social Sciences and Public Health*. 2023;5(1): 311-21.
17. Oga ASS, Tebi A, Aka J, Adouéni KV, Malan KA, Kouadio LP, Lokrou A. Diabetes mellitus diagnosis in Ivory Coast: epidemiological particularities. *Tropical medicine*. 2006;66(3):241-6.
18. Ankotche A, Binan Y, Leye A, Biekre AR, Adoueni V, Toutou T, Lokrou A. Tragic consequences of the economical cost of diabetes treatment in sub-Saharan countries (apart from the cost of complications): the Ivory Coast' example. *Medicine of Metabolic Diseases*. 2009; 3(1):100-5.
19. Sigal RJ, Armstrong MJ, Bacon SL, Boulé NG, Dasgupta K, Kenny GP, Riddell MC. Physical activity and diabetes. *Can J Diabetes*. 2018;42(2):S54-S63.
20. Lahcene, MA. The place of physical activity in the prevention of non-communicable diseases according to various WHO publications. *Excellence Journal Technical Sciences of Physical and Sports Activity*. 2022; 07:1125-39.
21. Duteau JE, Christelle M. Final survey report on Knowledge, Attitudes and practice: Survey on the knowledge, attitudes and practices of teachers of basic cycle 1 in the Goavian region regarding the management of risks and natural disasters [online]. ASB 2012 [Accessed 05/05/2023]. Available: http://www.preventionweb.net/.../27373_27373investigationcapfirstphasehatias.pdf.
22. Seck I, Fall IS, Faye A, Ba O, Tal-Dia A. Knowledge, attitudes and practices of women on malaria, in the rural area of Popouguine, Senegal. *Med Trop*. 2008; 68:629-33.
23. Fjeldsoe B, Neuhaus M, Winkler E, Eakin E. Systematic review of maintenance of behavior change after physical activity and dietary interventions. *Health psychology*. 2011;30(1):99.
24. Eves ND, Plotnikoff RC. Resistance training and type 2 diabetes: considerations for implementation at the population level. *Diabetes care*. 2006; 29(8):1933-41.
25. Yates T, Davies M, Gorely T, Bull F, Khunti K. Effectiveness of a pragmatic education program designed to promote walking activity in individuals with impaired glucose tolerance. *Diabetes Care*. 2009;32(8): 404-1410.
26. Colberg SR, Sigal RJ, Yardley JE, et al. Physical activity/exercise and diabetes: A position statement of the American Diabetes Association. *Diabetes Care*. 2016; 39:2065-79.
27. Chudyk A, Petrella RJ. Effects of exercise on cardiovascular risk factors in type 2 diabetes: A meta-analysis. *Diabetes Care*. 2011;34:1228-37.
28. Umpierre D, Ribeiro PA, Schaan BD, Ribeiro JP. Volume of supervised exercise training impacts glycaemic control in patients with type 2 diabetes: A systematic review with meta regression analysis. *Diabetologia*. 2013;56:242-51.
29. Umpierre D, Ribeiro PA, Kramer CK, et al. Physical activity advice only or structured exercise training and association with HbA1c levels in type 2 diabetes: A systematic review and meta-analysis. *JAMA*. 2011;305:1790-99.
30. Yates T, Haffner SM, Schulte PJ, Laine T, Kim MH, Connie WB & al. Association between change in daily ambulatory activity and cardiovascular events in people with impaired glucose tolerance (NAVIGATOR trial): A cohort analysis. *Lancet*. 2014;383:1059-66.
31. Doukouré D, Laurette AYM, Coulibaly M, Bayo S, Odile AT. Implications of diabetes in the social life of diabetic couples followed at the Anti-Diabetic Center of the National Institut of Public Health of Côte d'Ivoire. *Revue Africaine des Sciences Sociales et de la Santé Publique*. 2021; 3(2):59-74.
32. Sabarathinam S. A glycemic diet improves the understanding of glycemic control in diabetes patients during their follow-up. *Future science OA*. 2023;9(3):FSO843.
33. Chiu CJ, Liu S, Willett WC, Wolever TM, Brand-Miller JC, Barclay AW, Taylor, A. Informing food choices and health outcomes by use of the dietary glycemic

- index. *Nutrition Reviews*. 2011;69(4): 231–242.
34. Escoto KH, Laska MN, Larson N, Neumark-Sztainer D, Hannan PJ. Work hours and perceived time barriers to healthful eating among young adults. *American journal of health behavior*. 2012;36(6), 786–796.

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