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Research

Dietary knowledge and management practices of gestational diabetes mellitus among pregnant women attending ante-natal clinic at the University of Port Harcourt Teaching Hospital, Rivers State, Nigeria

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Background
Gestational diabetes mellitus (GDM) is of public health significance, especially because it predisposes both the mother and child to type 2 diabetes mellitus and obesity. Adequate dietary knowledge, when translated into appropriate management practices, has been shown to reduce the burden of GDM.

Objective
This study assessed the level of dietary knowledge and management practices among women with gestational diabetes mellitus attending an antenatal clinic at a tertiary hospital in Nigeria.

Methods
A descriptive cross-sectional design was employed. Convenience sampling was used to recruit 200 women with GDM. Data were collected using interviewer-administered questionnaires. Responses were analysed using the Statistical Package for the Social Sciences (SPSS), employing descriptive statistics and bivariate analyses to explore associations.

Results
Overall, 47% of the participants demonstrated good dietary knowledge, while 46.0% reported poor dietary management practices. Dietary knowledge was significantly associated with management practices ($p = 0.032$). No significant associations were observed with sociodemographic variables.

Conclusions
This study reveals gaps in dietary knowledge and management practices among women with GDM at a tertiary hospital in Nigeria. Knowledge was positively associated with practice, underscoring the need to strengthen nutrition education. Enhancing family support and ensuring the affordability, availability, and accessibility of recommended diets may improve dietary practices and contribute to more effective GDM management.

INTRODUCTION

Diabetes mellitus is a condition in which the body is unable to process food for energy properly. It is grouped into different types according to the circumstances present at diagnosis: Type 1, Type 2, gestational diabetes mellitus (GDM), and diabetes due to other causes (World Health Organisation 2023).

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INTRODUCTION

GDM is first detected during pregnancy, most commonly after 24 weeks of gestation (Metzger et al. 2010). One in six live births occurs in women with some form of hyperglycaemia during pregnancy, with GDM accounting for about 84% of these cases (National Institute for Health and Care Excellence 2015). Globally, about 200,000 cases are diagnosed each year, affecting approximately 7.0% of all pregnancies, making GDM a public health concern (Mukesh 2015). Several trials have shown its association with complications such as birth injuries, caesarean delivery, and preeclampsia (Rajesh 2016). Countries most affected include India, China, Nigeria, Pakistan, Indonesia, Bangladesh, Brazil, and Mexico (Hod et al. 2015). Screening for hyperglycemia during pregnancy, therefore, remains an important strategy in preventing pregnancy and delivery complications (National Institute for Health and Care Excellence 2015). GDM is more common in low-income settings, where lifestyle modification through culturally appropriate and affordable dietary interventions is recommended as a first strategy (Yamamoto et al. 2018).

Knowledge is a critical factor in health-seeking behaviour. It is the ability to access, understand, recall, and apply information, and is often acquired through learning, communication, and personal experience (Noha et al. 2018). In GDM, health literacy and knowledge of lifestyle modification have been shown to improve pregnancy outcomes (Deepa et al. 2014). In contrast, poor knowledge about a disease condition is associated with poor adherence to recommended management strategies (Ji et al. 2008). However, even with satisfactory knowledge levels, as observed in some African populations, practices may remain inadequate (Ali et al. 2022).

A high-fibre diet is recommended and effective in the management of GDM (Gunderson 2004). High-glycaemic-index foods have been implicated in post-prandial glucose peaks. A systematic review found that many women with GDM were unable to fully appreciate how lifestyle and dietary modifications could reduce risks for both themselves and their foetuses (McDermott et al. 2015). Two studies from Asia further reported that a majority of women with GDM (62.0%) had poor dietary knowledge, exhibited limited vegetable intake, and made only moderate diet-related changes even after counselling. (Zhang et al. 2015; De Seymour et al. 2016). Lack of knowledge, skills and individualised meal planning impeded effective dietary and management practices of GDM (Huang et al. 2021).

In Nigeria, research has primarily focused on dietary knowledge and management practices related to diabetes mellitus, whereas limited studies have examined these among women with GDM. The present study is part of a larger mixed-methods investigation examining dietary knowledge, practices, and associated factors among women with GDM in the University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria. The present paper focuses on a quantitative assessment of dietary knowledge and practices, while a complementary qualitative exploration of contextual factors will be reported separately.

METHODS

STUDY SETTING

This study was done in the antenatal clinic of the University of Port Harcourt Teaching Hospital (UPTH). It is one of the two tertiary teaching hospitals in the state, and a major research facility (University of Port Harcourt Institutions 2010).

STUDY DESIGN AND POPULATION

This was a descriptive cross-sectional survey involving 200 pregnant women with gestational diabetes mellitus who attended the antenatal clinic of the University of Port Harcourt Teaching Hospital from April to November 2020. All pregnant women attending antenatal care at UPTH who were diagnosed at a visit scheduled for 24 weeks of gestation and consented to participate were consecutively enrolled until the required sample size was reached.

DATA COLLECTION INSTRUMENTS AND VALIDATION

A structured questionnaire was used to collect sociodemographic data, dietary knowledge, and management practices among 200 women with GDM. The questionnaire was adapted from existing instruments and pretested on 20 participants from a similar population to ensure clarity, relevance, and internal consistency (Petersen 2015).

Dietary intake was assessed using two non-consecutive 24-hour recalls. Trained research assistants conducted interviews, employing a multiple-pass approach: listing all foods, probing for forgotten items, detailing meal times and preparation, and estimating portion sizes using household measures and food models (Slimani et al., 2011). Supervisors monitored data collection to ensure adherence to the protocol and minimize interviewer bias. Additionally, test-retest reliability was assessed for a subset of 20 participants over one week to confirm consistency.

DIETARY ASSESSMENT OF HIGH-GLYCAEMIC INDEX FOODS

Dietary intake was assessed using a food frequency questionnaire (FFQ) developed for this study, targeting commonly consumed high-glycaemic index foods. Based on published glycaemic index (GI) data (Omoregie & Osagie 2008), which measured GI values for key Nigerian staples. Participants reported their usual frequency of consumption using fixed-response categories: never or less than once a week, 1-3 times per month, once a week, 2-4 times per week, 5-6 times per week, once a day, and two or more times per day. Responses were coded directly from these categories and summarized as frequencies and percentages to describe the pattern of intake.

ETHICAL APPROVAL AND INFORMED CONSENT

Ethical approval was obtained from the Ethics and Research Committee of the University of Port Harcourt and the University of Port Harcourt Teaching Hospital, with number UPH/CEREMAD/REC/MM63/020. Participants were recruited with written consent. After the objectives of the study, the voluntary nature of their participation, and confidentiality of the study were communicated and assured.

DATA ANALYSIS

Dietary knowledge and management practices were

assessed using Bloom's cut-off point categorisation as summarised in Table 1 (Cochran 1963; Mereikwu et al. 2021).

Table 1: Scoring and classification criteria for dietary knowledge and dietary management practices

Assessment Area	No. of Items	Scoring System	Percentage Score	Classification
Dietary Knowledge	8	1 = incorrect response(s) 2= correct response(s)	Converted to percent using:(n- lowest possible sum) ÷ (highest possible sum - lowest possible sum) x 100	⩾70% = good 40-69% =fair 0 -39% =poor
Dietary management practices	10	1 = incorrect response(s) 2= correct response(s)	Converted to percent using:(n- lowest possible sum) ÷ (highest possible sum - lowest possible sum) x 100	⩾70% = good 40-69% =fair 0 -39% =poor

STATISTICAL ANALYSIS

Data were coded in Excel and analysed using the Statistical Package for the Social Sciences (SPSS) version 22, with frequency, percentages, means, and standard deviations. Chi-square test and Spearman's correlation were used to determine associations between variables of interest. Significance was set at P value < 0.05.

RESULTS

The socio-demographic characteristics of study participants are summarised in Table 2. Most of the respondents (73.5%) had completed tertiary education. This hospital primarily serves educated members of society. Their less educated counterparts would likely seek health care or ANC from traditional birth attendants and/or primary health care facilities.

Table 2: Social-demographic characteristics of study participants

Variable	Frequency (n)	Per cent (%)
Age		
18-25	29	14.5
26-30	57	28.5
31-35	66	33.0
36-40	39	19.5
41 and above	9	4.5
Marital Status		
Single	23	11.5
Married	175	87.5
Separated	2	1.0
Educational level		
Primary	7	3.5
Secondary	46	23.0
Tertiary	147	73.5
Ethnicity		
Hausa	5	2.5
Yoruba	16	8.0
Ahoada/Ogba	18	9.0
Ijaw	30	15.0
Ikwerre/etche	39	19.5
Igbo	92	46.0
Occupation		
Artisan	2	1.0
Stay home	13	6.5
Business	35	17.5
Unemployed	37	18.5
Employed government	50	25.0
Employed private	63	31.5

DIETARY KNOWLEDGE

Table 3a presents the responses to questions assessing dietary knowledge among women with GDM. Nearly all respondents (95.0%) recognised that diet plays a major role in managing GDM. Two-thirds (69.0%) had received a menu plan from a dietitian.

Table 3a: Dietary knowledge of women with GDM (n=200)

Variable	Frequency (n)	Per cent (%)
Knows that diet plays a major role in GDM management		
Yes	190	95.0
No	10	5.0
Clear understanding of daily meal		
Yes	94	47.0
No	106	53.0
Family and Friends	9	4.7
Internet and social media	20	10.5
Dietitian	64	28.4
Has had some nutrition education		
Yes	148	74.0
No	52	26.0
Knows about meal planning		
Yes	133	66.5
No	67	33.5
Has access to a dietitian		
Yes	115	57.5
No	85	42,5
A dietitian gave her a menu plan		
Yes	138	69.0
No	62	31.0
Meals with more fibre		
Meat, fish, and chicken	20	10.0
Milk and yoghurt	15	7.5
Fruit and vegetables	139	69.5
Don't know the correct answer	26	13.0
Beans and unripe plantain as the best fibre meal source		
Yes	115	57.5
No	39	19.5
Don't know the correct answer	46	23.0

The dietary knowledge of women with GDM was categorised into three levels: poor, fair, and good. The distribution of the respondents across these categories is presented in Table 3b.

Table 3b: Categorisation of dietary knowledge of women with GDM (n=200)

Variable	Frequency (n)	Per cent (%)
Poor knowledge (0 -39%)	36	18.0
Fair knowledge (40 -69%)	70	35.0
Good knowledge (70 – 100%)	94	47.0

DIETARY MANAGEMENT PRACTICES OF WOMEN WITH GDM

The assessment of dietary management practices of the respondents showed 184 (92.0%) claimed to have made a change in their diets as a result of their condition, however, it was recorded that only 48 (34.8%) follow their menu plan about 25-50% of the time, 79 (39.5%) consciously measured the food they eat to estimate calorie intake, 80 (40.0%) take three large meals and snacks per day and 40(20.0%) reported that there is added sugar/sweetener in their teas. Most respondents (97, 48.5%) ate dinner between 6 and 7:30 pm. Snack intake was evenly distributed: 66 (33.0%) snacked on fizzy drinks, 58 (29.0%) on confectionery, and 58 (29.0%) on fruits and vegetables. The dietary management practices score showed that only 38 (19.0%) respondents exhibited good dietary practices, while 69 (34.5%) demonstrated fair dietary practices for managing their condition (Table 4a).

Table 4a presents dietary management practices among women with GDM, including changes in food types, adherence to meal plans, and snacking patterns.

The dietary management practices scores of women with GDM were also classified as poor, fair or good. The distribution of respondents across these categories is shown in Table 4b.

Dietary management practices scores were supported by findings from the 24-hour dietary recall, which reflected the respondents' actual food intake in relation to their condition. Carbohydrates were consumed for breakfast by 56% of respondents; 59.5% for lunch; and 61.5% for dinner, often low-fibre varieties. The food frequency questionnaire further assessed carbohydrate consumption, which was usually high in glycaemic index. (Table 5).

Table 4a: Dietary Management Practices of Women with GDM (n=200)

Variable	Frequency (n)	Per cent (%)
Made changes in types of food?		
Yes	184	92.0
No	16	8.0
What is the main influence on your choices for what you eat?		
Foods that are available and what they cost	39	19.5
Whatever foods I feel like eating	22	11.0
Foods that are right for my condition	139	69.5
Food you crave for?		
Carbohydrate	79	39.5
Fruits and vegetables	93	46.5
Fatty and oily foods	8	4.0
Protein	14	7.0
Others	6	3.0
Followed the menu plan?		
Yes	104	75.4
No	34	24.6

Table 4b: Categorisation of Dietary Management Practices of women with GDM (n=200)

Variable	Frequency (n)	Per cent (%)
Poor practices	93	46.5
Fair practices	69	34.5
Good practices	38	19.0

Table 5: Pattern of consumption of high-glycaemic and high-fat foods (n=200)

Food	Never or less than once a month	1-3 times per month	Once a week	2-4 times per week	5-6times per week	Once a day	2-3 times per day	4 or more times per day
Yam	69(34.5)	47(23.5)	58(29.0)	22(11.0)	4(2.0)	0(0.0)	0(0.0)	0(0.0)
Ripe plantain	73(36.5)	30(15.0)	50(25.0)	33(16.5)	6(3.0)	4(2.0)	2(1.0)	2(1.0)
Garri/Cassava	14(7.0)	23(11.5)	42(21.0)	43(21.5)	34(17.0)	38(19.0)	6(3.0)	0(0.0)
White potatoes	111(55.5)	39(19.5)	28(14.0)	10(5.0)	4(2.0)	4(2.0)	4(2.0)	0(0.0)
White rice	26(13.0)	12(6.0)	33(16.5)	78(39.0)	33(16.5)	18(9.0)	0(0.0)	0(0.0)
Pasta	90(45.0)	31(15.5)	31(15.5)	44(22.0)	2(1.0)	2(1.0)	0(0.0)	0(0.0)
Baked Flour	70(35.0)	34(17.0)	40(20.0)	28(14.0)	10(5.0)	18(9.0)	0(0.0)	0(0.0)
Added sugar in tea	140(70.0)	14(7.0)	26(13.0)	2(1.0)	6(3.0)	12(6.0)	0(0.0)	0(0.0)
Carbonated drink	79(39.5)	34(17.0)	51(25.5)	12(6.0)	14(7.0)	10(5.0)	0(0.0)	0(0.0)
Watermelon/Pineapple	16(8.0)	12(6.0)	24(12.0)	47(23.5)	36(18.0)	40(20.0)	24(12.0)	1(5)
Flavoured fruit drinks	103(51.5)	32(16.0)	24(12.0)	25(12.5)	6(3.0)	8(4.0)	2(1.0)	0(0.0)
Jam/Marmalade	144(72.0)	18(9.0)	12(6.0)	12(6.0)	8(4.0)	2(2.0)	2(1.0)	0(0.0)
Agidi/yellow pap	73(36.5)	42(21.0)	25(12.5)	34(17.0)	7(3.5)	15(7.5)	2(1.0)	2(1.0)
Processed meat/fatty meat	16(8.0)	12(6.0)	24(12.0)	47(23.5)	36(18.0)	40(20.0)	24(12.0)	1(0.5)

ASSOCIATION BETWEEN SOCIO-DEMOGRAPHIC CHARACTERISTICS AND DIETARY KNOWLEDGE

As shown in Table 6, there were no significant associations between socio-demographic variables and respondents' dietary knowledge.

ASSOCIATION BETWEEN DIETARY KNOWLEDGE AND MANAGEMENT PRACTICES

As shown in Table 7, there was a significant association between dietary knowledge and management practices among these women with GDM.

Table 6: Relationship between dietary knowledge and socio-demographic characteristics of women with GDM

Variable	Poor Knowledge n (%)	Good/Fair Knowledge n (%)	x^2(P-Value)
Marital status			
Single	4 (11.1)	20 (12.2)	
Married	32 (88.9)	142 (86.6)	Fishers Exact (1.000)
Separated	0 (0.0)	2 (1.2%)	
Education			
Primary	3 (8.3)	13 (7.9)	
Secondary	4 (11.1)	33 (20.1)	Fishers Exact (0.445)
Tertiary	29 (80.6)	118 (72.0)	
Religion			
Christian	34 (94.4)	150 (91.5)	
Muslim	1 (2.8)	9 (5.5)	Fishers Exact (0.875)
Traditional	1 (2.8)	5 (3.0)	
Occupation			
Employed	3 (8.3)	34 (20.7)	
Unemployed	14 (38.9)	48 (29.3)	Fishers Exact (0.176)
Business/Artisan	19 (52.8)	82 (50.0)	
No of live births			
None	9 (25.0)	31 (18.9)	
1-2	14 (38.9)	68 (41.5)	0.690 (0.708)
3-4	13 (36.1)	65 (39.6)	
No of miscarriages			
None	29 (80.6)	109 (66.5)	
1-2	6 (16.7)	46 (28.0)	Fishers Exact (0.290)
3-5	1 (2.8)	9 (5.5)	
Age group			
⩽30	14 (38.9)	73 (44.5)	0.380 (0.582)
>30	22 (61.1)	91 (55.5)	
Income			
⩽ N60000*	20 (55.6)	110 (67.1)	1.721 (0.190)
>N60000	16 (44.4)	54 (32.9)	
Husband's income			
⩽N100000	12 (46.2)	63 (46.0)	0.000 (0.987)
>N100000	14 (53.8)	74 (54.0)	
Family size			
living alone	6 (16.7)	42 (25.6)	
2-4	21 (58.3)	77 (47.0)	1.829 (0.401)
4 and above	9 (25.0)	45 (27.4)	
Ethnicity			
Hausa	7 (19.4)	24 (14.6)	
Yoruba	3 (8.3)	35 (21.3)	Fishers Exact (0.306)
Rivers	8 (22.2)	33 (20.1)	
Igbo	18 (50.0)	72 (43.9)	

N381 = $ 1

Table 7: Relationship between dietary knowledge and dietary management practices of women with GDM

Variable	Good Practice	Fair Practice	Poor Practice	Fishers' Exact (p-value)
Poor knowledge	3 (7.9)	12 (17.4)	21 (22.6)	
Fair knowledge	9 (23.7)	30 (43.5)	31 (33.3)	0.032*
Good knowledge	26 (68.4)	27 (39.1)	41 (44.1)	

DISCUSSION

This study was designed to assess dietary knowledge and practices among women with GDM and to examine the associations between dietary knowledge and selected socio-demographic factors and dietary knowledge and management practices.

We found that 95% of our sample of women knew that diet is important in managing their condition, and 47% had a clear understanding of what their daily meals should consist of. These results were consistent with another study that found that women with GDM had moderate dietary knowledge (Tan et al. 2023). Other studies found that dietary knowledge and glycaemic control were better among educated and working women than among housewives (Hussain et al. 2015; Zheng et al. 2024). Some Asian research has found that the daily diet of pregnant women with GDM did not meet dietary guidelines and pregnant women with GDM had poor knowledge about diet management (p= 0.006) (Nowshin 2018; Mohameed et al. 2013). A Saudi Arabian study further revealed that women with GDM did not incorporate dietary fibre into their diets due to limited knowledge of its role (Castro-Barquero et al. 2020). The poor knowledge in these studies was credited to the fact that women with GDM had little or no contact with nutrition experts during pregnancy or had little information on dietary management after diagnosis. The high dietary knowledge scores in the present study could be due to early contact with a dietitian upon diagnosis, as indicated by 57.5% of the respondents.

Evaluation of dietary management practices of our sample of women with GDM found a very low score for good dietary practice (19.0%). With (39.5%), stating that they measured the food they ate using a household measure that estimates the grams and kilocalorie equivalents of the food. While 92.0% and 74.6% reported changing the types of food they consumed and following a menu plan, respectively, only 25.4% followed their menu plan 75-100% of the time. A majority reported consistently eating food with a high glycaemic index.

Similarly, it appears that good dietary practices for the management of GDM are uncommon. Studies from China, Bangladesh, Saudi Arabia, and Zimbabwe have reported poor dietary management practices by women with GDM (Hussain et al. 2015; Mohamed et al. 2013; Castro-Barquero et al. 2020; Kusemwa et al. 2019). The participants in these studies often reported low compliance with their dietary regimens, little or no physical activity, and poor glycaemic control.

Analysis of the association between our respondents' dietary knowledge and their socio-demographic characteristics showed no statistically significant relationships. Similar studies have reported that low levels of education were associated with poor knowledge and practice (Carolan 2013; Hui et al. 2014). Another study found that women with higher socio-economic status tend to use information and make plans to manage their GDM better (Zheng et al. 2024).

Nutrition knowledge was found to inform changes in poor food habits and promote alterations in nutritional status in several studies (Kusemwa et al. 2019; Evans and O'Brien 2005; Hernandez 2018; Rasmussen 2020). Similarly, in our study, 68.4% had good dietary knowledge and

consistent dietary practices, while only 7.9% of those with poor knowledge had consistent dietary practices. No relationship was found between nutritional knowledge and dietary practices in a study conducted in Rhode Island (Spirito et al. 2007).

The primary cue to consistent dietary practices in the present study could be the desire to see the baby alive and healthy. Many of the women in this study expressed a strong desire to have healthy babies and were thus willing to adopt healthy lifestyles.

STUDY LIMITATIONS

The present study relied on self-reported dietary recall, which may have introduced recall errors. The absence of biochemical parameters, such as fasting or postprandial blood glucose, limited our ability to assess the impact of dietary practices on glycaemic control objectively. In addition, the present study focused on statistical significance; however, future research should incorporate effect size considerations to provide greater insight into the practical relevance of the findings.

CONCLUSION

Dietary knowledge and management practices in GDM in Nigeria have not been widely studied. Women with GDM in this study demonstrated good dietary knowledge but often suboptimal management practices. We found no significant influence from socio-demographic factors. While statistically there were only weak associations between knowledge and practice, in other ways of viewing our data, there appeared to be a clear impact of knowledge on practice. For example, 68.4% had good dietary knowledge and consistent dietary practices, while only 7.9% of those with poor knowledge had consistent dietary practices.

These findings highlight a partial knowledge–practice gap, emphasising that awareness of dietary recommendations does not automatically result in consistent adherence. Strengthening nutrition education within antenatal care is therefore essential; however, efforts must extend beyond information provision. Practical skills, culturally relevant guidance, and continuous follow-up with dietitians are needed to support sustained dietary behaviour change. Addressing barriers to dietary adherence and reinforcing maternal motivation for healthy outcomes may improve compliance and ultimately enhance maternal and neonatal health in women with GDM.

AUTHOR CONTRIBUTIONS

CGO: Conceptualization, Methodology, Data curation, Formal analysis, Investigation, Writing - original draft, Writing- review and editing. TIC: Supervision, Review and editing. Both authors read and approve the final version for publication.

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN SCIENTIFIC WRITING

In the course of this manuscript preparation, ChatGPT (OpenAI, 2025) was used only to help improve clarity and phrasing. All research content, analysis and conclusions were entirely developed, reviewed and verified by the author.

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