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ACTIVATION LEVELS AMONG ADULT PATIENTS NEWLY DIAGNOSED WITH TYPE 2 DIABETES MELLITUS IN SELECTED LEVEL FIVE HOSPITALS, KENYA

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ABSTRACT

Background: Globally, prevalence of diabetes related complications has been on the rise and linked to poor skills and knowledge on the recommended self-care practices.

Objective: To establish activation levels among adult patients newly diagnosed with Type 2 Diabetes Mellitus (T2DM).

Method: Descriptive cross-sectional design was utilized to collect data from 124 randomly selected patients who were newly diagnosed with T2DM in the selected health care facilities. Data was collected using a closed ended questionnaire and the Patient Activation Measure® then analyzed using SPSS version 26. Descriptive analysis was done to generate frequencies while chi-square was done to assess association between the independent and dependent variables using a confidence interval of 95%.

Results: Females were the majority 70 (56.5%) with most participants 35 (28.3%) being between 60-69 years. Regarding duration of T2DM since diagnosis majority 45 (36.3%) reported four months. Only 45 (36.3%) had normal Body Mass Index (BMI) while 42 (33.9%) were obese. Low patient activation levels were noted in 88 (71.0%) of the study participants. The mean (SD) for the patient activation levels was 53.28 (± 7.27) corresponding to activation level 2. Variables found to have a statistically significant association were religion ($p=0.024$) and clinical duration of T2DM ($P=0.031$).

Conclusion: Activation levels were found to be low indicating low levels of confidence, knowledge and skills among adult patients newly diagnosed with T2DM. Therefore, clinicians need to adopt evidence-based strategies aimed at empowering newly diagnosed patients so as to activate them in adjusting their self-care practices.

INTRODUCTION

Globally, diabetes mellitus is a major cause of morbidity and mortality. By the year 2017, the prevalence of diabetes mellitus was estimated at 425 million and this number is estimated to rise to 629 million by the year 2040¹. A resurgence on diabetes complications globally has been reported. This has been linked to an increase on unhealthy lifestyle and a rise in rates of obesity among adults². A study done in Africa reported a surge in diabetes complications with high prevalence of peripheral neuropathy (38%), diabetic retinopathy (32%), diabetic nephropathy (31%) and peripheral arterial disease (19%)³. The burden of diabetes related complications is significantly high and there is need for innovative programs that prioritize promotion of self-care practices.

In Kenya, the prevalence of diabetes mellitus is estimated at 10.7% in the urban setting and 2.7% in the rural setting⁴. As the prevalence of diabetes mellitus rises in Kenya, a rise in diabetes related complications has also been observed. Findings of a study conducted in the Central region of Kenya show that there was an increased risk of developing Chronic Kidney Disease and Cardiovascular Diseases among individuals who had lived with Type 2 Diabetes Mellitus (T2DM) for more than five years⁵. The high prevalence of diabetes complications could be associated to the poor self-care practices reported in the region which has been associated to poor self-care practices⁶. This highlights the need to initiate evidence-based strategies targeting individuals newly diagnosed with T2DM to enable them acquire knowledge, skills and confidence needed in their self-management.

Patient Activation Measure® (PAM®) tool has been extensively used globally to assess

activation levels among patients diagnosed with chronic conditions and it assesses several important concepts in the chronic care management such as self-efficacy for positive health behaviors⁷. As thus, clinicians should utilize PAM® tool to evaluate the extent to which an individual is actively involved in their self-care management⁸. PAM® categorizes patients into one of the four activation levels based on their level of confidence, knowledge and skills. The aim is for patients to progress through the four levels of activation for them attain effective self-care practices.

An increase in patient activation level is significantly associated with improved self-care practices, good glycemic control and lower cost of healthcare⁹. Similarly, high activation scores is significantly associated with reduced body mass index, low levels of depression and improved engagement in physical activity¹⁰. Individuals newly diagnosed with T2DM perceive several challenges related to their self-care practices such as difficulty in understanding the recommended management, difficulties in developing needed skills and lack of motivation to adjust their lifestyle habits¹¹. Therefore, there is need for evidenced based strategies that will aid in identifying and reinforcing knowledge, skills and confidence among this population.

MATERIALS AND METHODS

Study design

This was a descriptive cross-sectional study design conducted between January and March 2023.

Study Setting

The study was conducted at Muranga and Kiambu level 5 Hospitals located in the central

region of Kenya. According to the Kenya Demographic and Health Survey 2014, Central Kenya has the second highest cases of Non-Communicable Diseases at > 50% and out of this T2DM ranks the highest at 41%¹². Therefore, the two Level 5 Hospitals were purposively selected.

Study Participants

Study participants consisted of 124 adult patients newly diagnosed with T2DM. The sample size was determined based on the formula for comparative studies using proportions then simple random sampling was used to recruit participants. The inclusion criteria involved adult patients who were newly diagnosed with T2DM and were currently attending their diabetes clinic at the selected study areas. Exclusion criteria included patients who had been diagnosed with diabetes related complications.

Study Tools

Interviewer-administered questionnaire was used to collect data on participant's socio-demographic and clinical data. To establish activation levels, the Patient Activation Measure[®] tool was used. Permission to use the tool was sought from *insignia Health* and a license issued. PAM[®] is a 13-item tool that contains questions seeking to assess patient's level of confidence, awareness and skills in managing their health alone. Total activation score was calculated by adding up the raw score then, divided by the number of items answered excluding the items answered as not applicable then multiplied by 13. The final score was then transformed to a scale with a theoretical range of 0-100 and categorized into either of the following four activation levels: level 1, (≤ 47.0), Level 2, (47.1–55.1), Level 3, (55.2–67.0) and Level 4, (≥ 67.1). Level 1 and 2 indicated that participants had low activation while, level 3 and 4 indicated high activation.

Study Procedure

Study tools were pretested to ascertain their suitability, appropriateness and practicability. Face and construct validities were ensured to ascertain that the study tools were formulated based on the study objectives. Reliability of the PAM[®] tool was ensured through the use of test-retest and a Cronbach's alpha of 0.81 was obtained. Data was collected by the primary investigator together with two trained research assistants. Informed consent was sought from the participants and later data on their demographic and clinical characteristics plus activation levels was obtained. The tools were then checked for completeness and accuracy then coded before the data entry.

Data Management

Data Entry, Analysis and Presentation

Data was entered into Statistical Package for Social Sciences (SPSS) version 26 for analysis. Levene's test was used to ascertain similarity of variances between the two study groups (p -value=0.365). Descriptive statistics were computed to generate socio-demographic and clinical characteristics plus the activation levels. Chi-square test of significance was used to assess the association between variables. A p value of < 0.05 was considered statistically significant. The data was presented in form of tables.

Ethical Considerations

Ethical approval was obtained from Kenyatta University Ethics Review Committee PKU/25602/E1726 and NACOSTI/1/p/22/21150. Authorization to carry out the study was also sought from the Ministry of Health in Muranga and Kiambu County Health Research Department. The aim of the study and all procedures were explained to the study participants. Voluntary and informed consent was then sought. Participants' names on the study tools were omitted to ensure anonymity. Confidentiality of data collected was observed.

RESULTS

Socio-demographic characteristics of the Participants

Majority 70(56.5%) of the participants were females. Eighty-nine 89(71.8%) of the

participants were married with 71(57.1%) of them residing in the urban set up. Most of the participants had attained either primary education 58 (46.8%) or secondary education 46(38.1%) as shown in table 1.

Table 1
Socio-demographic characteristics

| Variable | Category | Frequency N (%) |
|---------------------|---------------------|-----------------|
| Gender | Male | 54(43.5%) |
| | Female | 70(56.5%) |
| Age | 20-29 | 5(4.0%) |
| | 30-39 | 17(13.7%) |
| | 40-49 | 30(24.2%) |
| | 50-59 | 29(23.4%) |
| | 60-69 | 35(28.2%) |
| | >70 | 8(6.5%) |
| Marital status | Single | 14(11.3%) |
| | Married | 89(71.8%) |
| | Widowed | 12(9.7%) |
| | Divorced/ separated | 9(7.3%) |
| Occupational status | Formal employment | 22(17.7%) |
| | Self-employment | 55(44.4%) |
| | Unemployed | 31(25.0%) |
| | Pensioner | 16(12.9%) |
| Religion | Christianity | 122(98.4%) |
| | Other | 2(1.6%) |
| Residence | Urban setting | 71(57.3%) |
| | Rural setting | 53(42.7%) |
| Level of Education | None | 4(3.2%) |
| | Primary | 58(46.8%) |
| | Secondary | 46(38.1%) |
| | College/university | 16(12.9%) |

Participants Clinical Characteristics

From the time of diagnosis most 45 (36.3%) of the participants had lived with diabetes for a

period of four months. In terms of Body Mass Index (BMI), 45(36.3%) of the participants had a healthy weight while 42 (33.9%) were obese.

Table 2
Clinical characteristics

| Variable | Category | Frequency N (%) |
|---------------------------|---------------------------------------|-----------------|
| Clinical Duration of T2DM | One month and below | 16 (12.9%) |
| | Two months | 12 (9.7%) |
| | Three months | 25 (20.2%) |
| | Four months | 45 (36.3%) |
| | Five months | 10 (8.1%) |
| | Six months | 16 (12.9) |
| Treatment Regime | Oral anti-diabetic drugs only | 92 (74.2%) |
| | Insulin only | 18 (14.5%) |
| | Oral anti- diabetic drugs and insulin | 11 (8.9%) |
| | Do not know | 1 (0.8%) |
| | On diet only | 2 (1.6%) |
| BMI | Underweight < 18.5 | 5 (4.0%) |
| | Normal 18.5-24.9 | 45 (36.3%) |
| | Overweight (25-29.9) | 32 (25.8%) |
| | Obesity >31 | 42 (33.9%) |

Participants Activation Scores

PAM[®] tool was used to collect data on participant's activation levels. The tool was rated in a scale ranging from strongly disagree (1) to strongly agree (4) and not applicable (0) option. Majority of the participants 103 (83.1%) agreed that they were responsible for taking care of their health. Regarding participant's

knowledge on the prescribed medications, majority 57 (46.0%) strongly disagreed that they knew the mechanism of action of the treatment regime they were on. Only, 42 (33.9%) agreed that they had been able to maintain the recommended lifestyle behaviours such as eating healthy and exercising.

Table 3
Participants Activation Scores

| | Statements assessing activation levels | N/A (0) | Disagree Strongly (1) | Disagree (2) | Agree (3) | Agree Strongly (4) |
|----|---|----------------|------------------------------|---------------------|------------------|---------------------------|
| 1 | I am the person who is responsible for taking care of my health | 0 (0.0%) | 1 (0.8%) | 4 (3.2%) | 103 (83.1%) | 16 (12.9%) |
| 2 | Taking an active role in my own health care is the most important thing that affects my health | 0 (0.0%) | 1 (0.8%) | 12 (9.7%) | 100 (80.6%) | 11(8.9%) |
| 3 | I am confident I can help prevent or reduce problems associated with my health | 3 (2.4%) | 46 (37.1%) | 29 (23.4%) | 42 (33.9%) | 4 (3.2%) |
| 4 | I know what each of my prescribed medications do | 5 (4.0%) | 57 (46.0%) | 49 (39.5%) | 13 (10.5%) | 0 (0.0%) |
| 5 | I am confident that I can tell whether I need to go to the doctor or whether I can take care of a health care problem by myself | 2 (1.6%) | 35 (28.2%) | 30 (24.2%) | 53 (42.7%) | 4 (3.2%) |
| 6 | I am confident that I can tell a doctor concerns I have even when he or she does not ask | 4 (3.2%) | 3 (2.4%) | 14 (11.3%) | 63 (50.8%) | 40 (32.3%) |
| 7 | I am confident that I can follow through on medical treatments I may need to do at home | 4 (3.2%) | 4 (3.2%) | 20 (16.1%) | 90 (72.6%) | 6 (4.8%) |
| 8 | I understand my health problems and what causes them | 1 (0.8%) | 52 (41.9%) | 55 (44.4%) | 15 (12.1%) | 1 (0.8%) |
| 9 | I know what treatments are available for my health problems | 3 (2.4%) | 67 (54.0%) | 37 (29.8%) | 17 (13.7%) | 0 (0.0%) |
| 10 | I have been able to maintain (keep up with) lifestyle changes, like eating right or exercising | 1 (0.8%) | 21 (16.9 %) | 57 (46.0%) | 42 (33.9%) | 3 (2.4%) |
| 11 | I know how to prevent problems with my health | 2 (1.6 %) | 67 (54.0%) | 45 (36.3%) | 10 (8.1%) | 0 (0.0%) |
| 12 | I am confident I can figure out solutions when new problems arise with my health | 2 (1.6 %) | 69 (55.6%) | 37 (29.8%) | 16 (12.9%) | 0 (0.0%) |

| | | | | | | |
|----|---|----------|------------|------------|------------|-----------|
| 13 | I am confident that I can maintain lifestyle changes, like eating right and exercising even during time of stress | 1 (0.8%) | 35 (28.2%) | 51 (41.1%) | 35 (28.2%) | 2 (1.6 %) |
|----|---|----------|------------|------------|------------|-----------|

Participants Activation Levels

Total activation score was calculated by adding up the raw score then, divided by the number of items answered excluding the items answered as not applicable then multiplied by 13. The final score was then transformed to a

scale with a theoretical range of 0-100 and then categorized into the four activation levels.

Majority 63 (50.8%) of the participants scored level 2 with an overall activation mean score (SD) of 53.28 ±7.27 which corresponds to activation level 2.

Table 4

Participants Activation Levels and the Mean

| Activation levels | Descriptive Statistics | | | |
|------------------------|------------------------|-------|------------|----------------|
| | N (%) | Mean | Std. Error | Std. Deviation |
| Level 1 (≤47.0) | 25 (20.2) | 44.75 | 1.45 | 2.05 |
| Level 2 (47.1-55.1) | 63 (50.8) | 53.80 | 0.76 | 2.14 |
| Level 3 (55.2–67.0) | 30 (24.2) | 59.65 | 3.85 | 5.44 |
| Level 4 (≥67.1) | 6 (4.8) | 71.10 | 1.02 | 2.21 |
| Overall PAM mean score | 124 (100) | 53.28 | 0.65 | 7.27 |

Distribution of activation levels according to participants socio-demographic characteristics

Only 23 (18.5%) of participants who were married and 16 (12.9%) of those who had attained primary school education scored high activation levels. Irrespective of their age majority of the participants had an activation level of 2. Most 122 (98.39%) of the participants who were Christians scored activation level of 2. Likewise, the study results demonstrated a

significant relationship between religion and activation levels (p-value=0.024) as shown in table 5.

Distribution of activation levels according to participant’s clinical characteristics

Most of the participants scored an activation level of 2. Also, there was a significant relationship between clinical duration of T2DM and activation levels (p-value=0.031) as shown in table 6.

Table 5*Distribution of activation levels according to participants socio-demographic characteristics*

| Variable | Category | Frequency | Level 1 | Level 2 | Level 3 | Level 4 | df, χ^2 , P value |
|---------------------|--------------------|------------|-----------------|-------------|-------------|-----------------|------------------------|
| | | N (%) | (≤ 47.0) | (47.1–55.1) | (55.2–67.0) | (≥ 67.1) | |
| Gender | Male | 54(43.5%) | 15(12.1%) | 24(19.4%) | 12(9.7%) | 3(2.4%) | 3,3.770,0.287 |
| | Female | 70(56.5%) | 10(8.1%) | 38(30.6%) | 19(15.3%) | 3(2.4%) | |
| Age | 20-29 | 5(4.0%) | 1(0.8%) | 4(3.2%) | 0(0%) | 0(0%) | 15,17.154,0.29 |
| | 30-39 | 17(13.7%) | 5(4.0%) | 6(4.8%) | 5(4.0%) | 1(0.8%) | |
| | 40-49 | 30(24.2%) | 6(4.8%) | 14(11.3%) | 9(7.3%) | 1(0.8%) | |
| | 50-59 | 29(23.4%) | 4(3.2%) | 18(14.5%) | 7(5.6%) | 0(0%) | |
| | 60-69 | 35(28.2%) | 6(4.8%) | 18(14.5%) | 9(7.3%) | 2(1.6%) | |
| | >70 | 8(6.5%) | 3(2.4%) | 2(1.6%) | 1(0.8%) | 2(1.6%) | |
| Marital status | Single | 14(11.3%) | 5(4.0%) | 4(3.2%) | 3(4.2%) | 1(0.8%) | 9,6.591,0.680 |
| | Married | 89(71.8%) | 17(13.7%) | 45(36.2%) | 23(18.5%) | 4(3.2%) | |
| | Widowed | 12(9.7%) | 1(0.8%) | 9(7.3%) | 2(1.6%) | 0(0%) | |
| | Divorced/separated | 9(7.3%) | 2(1.6%) | 4(3.2%) | 2(1.6%) | 1(0.8%) | |
| Occupational status | Formal employment | 22(17.7%) | 5(4.0%) | 11(8.9%) | 6(4.8%) | 0(0%) | 9,5.695,0.770 |
| | Self-employment | 55(44.4%) | 10(8.1%) | 31(25.0%) | 12(9.7%) | 2(1.6%) | |
| | Unemployed | 31(25.0%) | 7(5.6%) | 15(12.1%) | 6(4.8%) | 3(2.4%) | |
| | Pensioner | 16(12.9%) | 3(2.4%) | 6(4.8%) | 6(4.8%) | 1(0.8%) | |
| Religion | Christianity | 122(98.4%) | 25(20.2%) | 62(50.0%) | 30(24.2%) | 5(4.0%) | 3,9.470,0.024 |
| | None | 2(1.6%) | 0(0%) | 1(0.8%) | 0(0%) | 1(0.8%) | |
| Residence | Urban setting | 71(57.3%) | 15(12.1%) | 38(30.6%) | 15(12.1%) | 3(2.4%) | 3,1.093,0.779 |
| | Rural setting | 53(42.7%) | 10(8.1%) | 25(20.2%) | 15(12.1%) | 3(2.4%) | |
| | None | 4(3.2%) | 0(0%) | 3(2.4%) | 1(0.8%) | 0(0%) | 9,2.122,0.989 |

| | | | | | | |
|--------------------|--------------------|-----------|----------|-----------|-----------|---------|
| Level of Education | Primary | 58(46.8%) | 12(9.7%) | 27(21.8%) | 16(12.9%) | 3(2.4%) |
| | Secondary | 46(37.1%) | 9(7.3%) | 24(19.4%) | 11(8.9%) | 2(1.6%) |
| | College/university | 16(12.9%) | 4(3.2%) | 8(6.5%) | 3(2.4%) | 1(0.8%) |

Table 6

Distribution of activation levels according to participant's clinical characteristics

| Variable | Category | Frequency N (%) | Level 1 | Level 2 | Level 3 | Level 4 | df, χ^2 , P value |
|---------------------------|--------------------------------------|-----------------|-----------------|-------------|-------------|-----------------|------------------------|
| | | | (≤ 47.0) | (47.1–55.1) | (55.2–67.0) | (≥ 67.1) | |
| Clinical Duration of T2DM | One month and below | 16 (12.9%) | 8(6.5%) | 6(4.8%) | 2(1.6%) | 0(0%) | 15,26.767,0.031 |
| | Two months | 12 (9.7%) | 0(0%) | 8(6.5%) | 3(2.4%) | 1(0.8%) | |
| | Three months | 25 (20.2%) | 5(4.0%) | 10(8.1%) | 8(6.5%) | 2(1.6%) | |
| | Four months | 45 (36.3%) | 5(4.0%) | 27(21.8%) | 12(9.7%) | 1(0.8%) | |
| | Five months | 10 (8.1%) | 3(2.4%) | 5(4.0%) | 0(0%) | 2(1.6%) | |
| | Six months | 16 (12.9%) | 4(3.2%) | 7(5.6%) | 5(4.0%) | 0(0%) | |
| Treatment | Oral anti-diabetic drugs only | 92 (74.2%) | 19(36.3%) | 47(37.9%) | 20(16.1%) | 6(4.8%) | 12,10.034,0.613 |
| | insulin only | 18 (14.5%) | 3(2.4%) | 8(6.5%) | 7(5.6%) | 0(0%) | |
| | Oral anti-diabetic drugs and insulin | 11 (8.9%) | 2(1.6%) | 6(4.8%) | 3(2.4%) | 0(0%) | |
| | Do not know | 1 (0.8%) | 1(0.8%) | 0(0%) | 0(0%) | 0(0%) | |
| | On diet only | 2 (1.6%) | 0(0%) | 2(1.6%) | 0(0%) | 0(0%) | |
| BMI | Underweight < 18.5 | 5 (4.0%) | 4(3.2%) | 1(0.8%) | 1(0.8%) | 0(0%) | 9,12.996,0.163 |
| | Normal (18.5-24.9) | 45 (36.3%) | 10(8.1%) | 21(16.9%) | 9(7.3%) | 3(2.4%) | |
| | Overweight (25-29.9) | 32 (25.8%) | 5(4.0%) | 18(14.5%) | 10(8.1%) | 0(0%) | |
| | Obesity >30 | 42 (36.8%) | 6(4.8%) | 23(18.5%) | 10(8.1%) | 3(2.4%) | |

DISCUSSION

The purpose of this study was to establish activation levels among adult patients newly diagnosed with T2DM. Majority of the participants were females, married and self-employed. Most of the participants had attained either primary or secondary education. Similar demographic characteristics findings have been reported in other studies^{5, 13}. This could be associated to the fact that most patients who participate in diabetes healthy preventive behaviours are women, adults above 65 years and those who have attained higher level of education. Findings from this study showed that a substantial part of adult patients newly diagnosed with T2DM registered low activation levels. This indicates that the participants lacked the knowledge, skills and confidence to take action in their self-care management. The findings were consistent with a study done in Korea which reported that patients who had lived with T2DM for a duration of 0 to 6 years scored low activation levels¹⁴. This could be associated with participants' lack of exposure to any patient tailored intervention. On the contrary a study by Miller in Australia found that at baseline majority of the participants were highly activated with 100 (42.9%) of the participants scoring level 3. This was attributed to the fact that a high proportion of the participants were self-referred to the DESMOND program¹³. A study done in the UK reported inconsistent findings where majority of patients were found to be highly activated at baseline with 321 (45.9%) attaining level 3 and 99 (14.1%) level 4. The study attributed the high activation levels to the self-report nature of the questionnaire where patients were asked to recall healthcare services provided for the last 12 months¹⁵.

In this study the activation mean score were lower compared to a study by Glenn which reported higher activation mean at baseline of 60.48 (SD=12.9). The study associated the high activation levels among participants to the fact that the study sample were predominantly older and female¹⁶. Developed countries have reported higher activation levels among individuals diagnosed with T2DM, indicating existence of barriers among patients diagnosed with T2DM in Kenya.

CONCLUSION

Study participants had low activation levels indicating that they had some awareness on the recommended management for T2DM but lacked the confidence and skills needed for them to achieve efficacy in their self-care practices. Additionally, low activation levels indicated that the participants believed that their role in the management of T2DM was crucial in attaining good clinical outcome but did not initiate the needed action into achieving the recommended self-care practices.

RECOMMENDATIONS

There is need to enhance activation among patients newly diagnosed with T2DM in Kenya. Clinicians should adopt evidenced based strategies with the aim of empowering patients to become more active in their self-care practices. This will help in slowing the progression of diabetes and development of its complications which is an urgent priority for the healthcare system in Kenya.

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