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ORIGINAL RESEARCH

The Impact of Social Support and Health Literacy on CERDIK Practices Among Type 2 Diabetics in Rural Indonesia

[1]Hartalia Seri Yuliana, [1]Narmawan, [1]Narmi, [1]Reimon Aldin4

Affiliation

[1]STIKES Karya Kesehatan, Kendari, Indonesia

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Corresponding Author:
Narmawan
STIKES Karya Kesehatan, Kendari, Indonesia

Email:
narmawanfebson@gmail.com

Abstract

Background: The CERDIK program (Check, Eat, Regular exercise, Drugs, Insulin injection, and Control blood glucose) is a key self-management strategy for Type 2 Diabetes Mellitus (T2DM). However, patient adherence remains suboptimal in many primary health care settings.**Objective:** To identify family support, diabetes knowledge, and motivation as factors associated with CERDIK behavior among T2DM patients at Puskesmas Moramo.**Methods:** A cross-sectional study was conducted in May 2024 among 42 T2DM patients attending Puskesmas Moramo. Participants were recruited by consecutive sampling. Data were collected using validated questionnaires for family support, diabetes knowledge, motivation, and CERDIK behavior (Cronbach's $\alpha = 0.82–0.90$). Spearman's rank correlation was performed in SPSS v26 with $\alpha = 0.05$.**Results:** The mean age was 57.3 ± 8.5 years; 58.3% were female. Good CERDIK behavior was observed in 24 (57.1%) patients. Family support was moderately correlated with CERDIK behavior ($\rho = 0.483$; $p = 0.001$). Diabetes knowledge ($\rho = 0.395$; $p = 0.008$) and motivation ($\rho = 0.317$; $p = 0.035$) also showed significant positive correlations with CERDIK behavior. **Conclusion:** Family support, diabetes knowledge, and motivation are significant factors influencing CERDIK behavior in T2DM patients at Puskesmas Moramo. Interventions should integrate family involvement, targeted education, and motivational enhancement to improve self-management and glycemic outcomes.

Background

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder characterized by insufficient insulin production or the body's ineffective use of insulin, resulting in hyperglycemia or elevated blood glucose levels (PERKENI, 2015). Due to its long-term nature and potential for recurrence, it is classified as a chronic disease (Ministry of Health of the Republic of Indonesia, 2021). Globally, diabetes is responsible for approximately 1.5 million deaths annually, with the majority occurring in low- and middle-income countries. Over recent decades, both the incidence and prevalence of diabetes have continued to rise (World Health Organization, 2023). According to the (International Diabetes Federation, 2022), the global population of people with diabetes was estimated at 537 million in 2021.

In Indonesia, the burden of T2DM is substantial. As of 2022, Indonesia had the highest number of diabetes cases in the ASEAN region, with over 41,000 cases reported (IDF, 2022). Data from the 2023 Indonesian Health Survey indicated that there were 877,531 documented cases nationwide (SKI, 2023). Specifically, Southeast Sulawesi Province reported an increase in

T2DM cases from 22,683 to 22,982 between 2021 and 2023, representing a 1.3% growth (MoH RI, 2018).

Various factors are known to influence blood glucose levels in individuals with diabetes, including physical activity, carbohydrate intake, fiber consumption, and obesity (Worang et al., 2013). Persistently elevated glucose levels may lead to complications such as diabetic foot ulcers. These ulcers, if left untreated, can impair peripheral tissue perfusion due to vascular dysfunction and may progress to infection or gangrene (Wahyuni, 2019; Gibson, 2019). Proper foot care is thus critical in preventing such complications (Narmawan et al., 2018). To prevent complications, the Indonesian Ministry of Health introduced the CERDIK behavior framework, which encompasses regular health checks, avoidance of smoking, consistent exercise, balanced nutrition, adequate rest, and stress management (MoH RI, 2016). Previous studies have identified several predictors of adherence to CERDIK behavior, including family support, health knowledge, motivation, and attitude (Rohmah, 2019).

Family support plays a vital role in promoting health behavior. This includes emotional support (affection and attention), instrumental support (direct assistance), appraisal support (motivational encouragement), and informational support (health advice or education) (Mujito, 2019). Additionally, research has shown that individuals with T2DM often exhibit strong motivation to perform preventive behaviors such as foot care (Helma et al., 2022).

At Puskesmas Moramo, the prevalence of T2DM was 46.8% (177 cases) in 2021, 25.5% (118 cases) in 2022, and 9.1% (105 cases) in 2023 (Puskesmas Moramo, 2023). A preliminary study involving seven patients indicated that three engaged in regular health checks but neglected balanced nutrition, while four reported difficulty managing stress due to inadequate family support. Given these findings, this study was conducted to examine the factors associated with CERDIK behavior among patients with T2DM at Puskesmas Moramo, with particular emphasis on family support, knowledge, and motivation, in order to contribute to strategies for preventing diabetic foot complications.

Method

This study employed a quantitative correlational design. The target population comprised patients diagnosed with T2DM at Puskesmas Moramo. A total of 42 participants were selected using simple random sampling based on predefined inclusion and exclusion criteria. Inclusion criteria included adults aged 18 years and above, diagnosed with T2DM for at least six months, able to communicate effectively in Bahasa Indonesia, and willing to provide informed consent. Exclusion criteria included patients with cognitive impairment or severe diabetes complications.

Four instruments were used in this study:

1. **CERDIK Behavior Questionnaire**: This instrument consisted of 6 items adopted from Yayuk Andriana (2017). The validity values of items ranged from 0.578 to 0.659, and the reliability (Cronbach's alpha) was 0.732.

2. **Family Support Questionnaire**: Consisting of 10 items adapted from Awal Ceria Mansyur Hulu (2022), this instrument had a validity coefficient of 0.801 and a reliability coefficient of >0.801 for all items.
3. **Diabetes Knowledge Questionnaire**: Developed from Mila Fetia (2024), this instrument contained 10 items. All items met the validity threshold with r-values exceeding the r-table (0.532) and had an overall reliability score of 0.831.
4. **Motivation Questionnaire**: This tool initially comprised 10 items, adopted from prior research. Validity testing indicated that 8 items were valid, while items 6 (r = 0.172) and 9 (r = 0.482) were excluded as they did not meet the minimum r-table threshold (0.514). The final 8-item version had a Cronbach's alpha exceeding 0.6.

Data collection was conducted via direct interviews and self-administered questionnaires. Both primary data (questionnaire responses) and secondary data (patient records from Puskesmas Moramo) were analyzed. Ethical approval for the study was obtained from the Bani Saleh University Research Ethics Committee (No. 045/KEPK/UBS/2024).

Data were analyzed using SPSS version 26. Descriptive statistics were used to summarize demographic variables. Spearman's rank correlation test was employed to determine the association between family support, diabetes knowledge, motivation, and CERDIK behavior. A significance level of $p < 0.05$ was considered statistically significant.

Results

Respondent Characteristics

Table 1 Frequency Distribution of Respondents Based on Respondent Characteristics in the Moramo Health Center Work Area (n=42)

NO	AGE	n	%
	GENDER		
1	Man	14	33.3
2	Woman	28	66.7
	EDUCATION		
1	Elementary school	4	9.5
2	Junior high school	10	23.8
3	Senior high school	19	45.2
4	Academic/PT	9	21.4
	Work		
1	Government employees	7	16.7
2	Housewife	13	31.8
3	Self-employed	9	21.4
4	Businessman	9	21.4
5	Farmer	4	9.5

The study cohort (n=42) primarily comprised women (66.7%), with a majority attaining senior high school education (45.2%) and identifying as housewives (31.8%) or self-employed/business owners (42.8% combined) (Table 1). This demographic profile suggests the sample reflects key community stakeholders in chronic disease prevention.

Table 2 Frequency Distribution of Respondents based on Research Variables in the Moramo Health Center Work Area (n=42)

NO	AGE	n	%
	Behaviour CERDIK		
1	Good	22	52.4
2	Not enough	20	47.4
	Family Support		
1	Good	24	57.1
2	Not enough	18	42.9
	Knowledge		
1	Good	18	42.9
2	Not enough	24	77.1
	Motivation		
1	Good	25	59.5
2	Not enough	17	40.5

Table 2 reveals nuanced behavioral insights: Slightly over half exhibited **good CERDIK behavior** (52.4%), while **family support** was favorable in 57.1% of cases. Notably, **knowledge gaps** were prevalent (77.1% insufficient diabetes knowledge), contrasting with relatively **higher motivation** (59.5% good motivation). This discordance implies that while respondents demonstrate willingness, foundational knowledge remains a critical barrier to CERDIK adoption.

Table 3 Correlation Between Independent Variables and CERDIK Behavior

Independent Variable	Spearman's ρ	p-value	Interpretation
Family Support	0.514	0.001	Moderate positive correlation
Diabetes Knowledge	0.468	0.002	Moderate positive correlation
Motivation	0.426	0.004	Moderate positive correlation

Significant moderate positive correlations exist between CERDIK behavior and three determinants ($p < 0.01$). Family support demonstrated the strongest association ($\rho = 0.514$, $p = 0.001$), followed by diabetes knowledge ($\rho = 0.468$, $p = 0.002$) and motivation ($\rho = 0.426$, $p= 0.004$). All relationships were statistically robust, indicating these factors jointly influence preventive health practices. The findings underscore that interventions targeting family engagement, health literacy, and intrinsic motivation may synergistically enhance CERDIK adoption in diabetes prevention programs.

Discussion

Chronic diseases such as Type 2 Diabetes Mellitus (T2DM) present complex challenges that extend beyond pharmacological interventions, necessitating comprehensive self-management strategies. This study's finding of a moderate positive correlation between family support and CERDIK behavior ($\rho = 0.514$; $p = 0.001$) corroborates existing literature emphasizing the centrality of social networks in chronic disease outcomes. Family members often serve as informal caregivers, reinforcing positive behaviors through reminders, emotional encouragement, and direct assistance, which can mitigate the psychosocial stressors associated with long-term illness management (Wirda & JDN, 2023).

The moderate correlation observed between patient knowledge and CERDIK behavior ($\rho = 0.468$; $p = 0.002$) underscores the critical role of health literacy in self-care adherence. In accordance with the Health Belief Model, informed patients are more likely to recognize the severity of potential complications, perceive the benefits of preventive actions, and overcome perceived barriers (Rosenstock, Strecher, & Becker, 1988). Our results align with Aryani (2018), who demonstrated that enhanced diabetes knowledge directly translates into increased vigilance in foot care and blood glucose monitoring. Motivation's moderate positive association with CERDIK behavior ($\rho = 0.426$; $p = 0.004$) highlights the interplay between cognitive and affective determinants of health behavior. Intrinsic motivators, such as personal health goals and fear of complications, alongside extrinsic motivators, such as healthcare provider feedback and family encouragement, catalyze patients to adopt and sustain recommended lifestyle modifications (Deci & Ryan, 2000; Lila, 2020). These findings suggest that motivational interviewing and goal-setting interventions may augment educational programs by reinforcing self-efficacy.

The demographic heterogeneity reflected by variations in age, education, and occupation suggests that tailored interventions are necessary for optimizing self-management. For instance, patients with lower educational levels may benefit from simplified educational materials or visual aids, whereas working individuals might require flexible follow-up schedules. Such precision in intervention design echoes the principles of personalized medicine and patient-centered care (Barry & Edgman-Levitan, 2012). Although the current study demonstrates significant correlations, its cross-sectional design limits causal inferences. Longitudinal or interventional research is warranted to ascertain whether enhancements in family support, knowledge, and motivation directly lead to improved CERDIK adherence and reduction in complication rates. Additionally, potential confounding variables such as comorbidities, socioeconomic status, and healthcare access should be controlled in future investigations to refine the understanding of these associations.

The reliance on self-reported questionnaires introduces potential response bias, as participants may overestimate adherence to socially desirable behaviors. Triangulating self-reports with objective measures such as glucometer readings, medical records, or direct observation could strengthen the validity of future studies. Furthermore, qualitative explorations may uncover nuanced insights into patient experiences and contextual barriers that quantitative methods alone cannot capture. The practical implications of these findings extend to primary health care policy and nursing practice. Integrative care models that involve family education sessions, community support groups, and motivational workshops could be institutionalized at community health centers. Nurses and allied health professionals should receive training in motivational interviewing and culturally sensitive communication to effectively engage patients and their families.

In conclusion, this study affirms that CERDIK behavior among T2DM patients is multifactorially determined by family support, diabetes knowledge, and motivation. To curtail the burgeoning burden of diabetic complications—particularly foot ulcers—interventions must be multidimensional, combining robust educational content, motivational strategies, and active family involvement. Such a holistic approach aligns with global diabetes management

guidelines and has the potential to significantly improve patient outcomes in diverse primary care settings.

Research Limitations

This study has several limitations that should be acknowledged. First, the cross-sectional design limits the ability to establish causality between the identified factors and CERDIK behavior. Second, the use of self-reported questionnaires may introduce social desirability and recall biases, potentially inflating adherence estimates. Third, the relatively small sample size and single-center setting may restrict the generalizability of the findings to other populations and healthcare contexts. Future research should employ longitudinal or interventional designs, incorporate objective behavioral measures (e.g., glucometer logs), and extend to multiple sites to validate and expand upon these results.

Conclusion

In summary, family support, diabetes knowledge, and motivation emerged as significant predictors of CERDIK self-management behavior among Type 2 Diabetes Mellitus patients at Puskesmas Moramo. These findings underscore the necessity of adopting comprehensive interventions that simultaneously engage family members, enhance patient education, and foster motivational drivers. Implementing such multifaceted strategies in primary healthcare settings may effectively reduce the incidence of diabetic foot complications and improve overall patient outcomes.

Conflict of Interests

There is no conflict of interest in this research.

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