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OPEN ACCESS ORIGINAL ARTICLE

Awareness and Adherence to the Guideline-Directed Medical Therapy for Treatment of Diabetes Among Physicians in Aden, Yemen: A Nationwide Survey

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ABSTRACT

This study examines the awareness and adherence of physicians in Aden, Yemen, to national diabetes management guidelines, focusing on the challenges affecting implementation. A cross-sectional survey was conducted in July 2023 with 115 physicians from various hospitals in Aden, Yemen. The survey explored physicians' familiarity with the guidelines, the frequency of their review, and perceived obstacles to adherence. The sample comprised 70 male (60.9%) and 45 female (39.1%) physicians, with most working in urban hospitals (73.9%). The majority (91.3%) were aged 60 or younger, and 56.5% were specialists, including endocrinologists and internal medicine physicians. The findings revealed that 68% of physicians were aware of the guidelines, with 93% adhering to them for most patients. A significant 67% felt the guidelines improved patient outcomes, and 75% were confident in implementing them. However, 77% of respondents faced barriers to full implementation, such as limited resources, patient non-compliance, and insufficient training. Despite high awareness, adherence was hindered by these challenges. The study underscores the need for better resource allocation, targeted educational initiatives, and ongoing professional development to enhance adherence to diabetes management guidelines and improve patient care outcomes in Yemen.

Keywords: Diabetes management, Physician adherence, Guideline awareness, Barriers to implementation, Healthcare in Yemen.

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INTRODUCTION

Diabetes mellitus (DM) is one of the most prevalent chronic diseases worldwide, affecting an estimated 537 million adults in 2021, a number expected to rise to 783 million by 2045 [1] . It is associated with significant morbidity, including cardiovascular disease, kidney failure, and neuropathy. As a result, timely and evidence-based management of diabetes is crucial to prevent complications and improve patient outcomes [2]. Clinical guidelines have been developed to standardize the treatment of diabetes and provide healthcare professionals with evidence-based recommendations to ensure optimal patient care.

In Yemen, where healthcare resources are often limited, adherence to national diabetes management guidelines is essential to achieve the best possible clinical outcomes. However, awareness and adherence to these guidelines can vary among healthcare providers based on factors such as familiarity, access to resources, ongoing education, and practical barriers encountered in clinical practice [3]. Physicians are at the forefront of diabetes management, and their understanding of, and adherence to, clinical guidelines play a pivotal role in the overall quality of diabetes care. Studies have shown that guideline adherence among physicians improves patient outcomes, but factors such as time constraints, lack of training, insufficient resources, and patient-related factors often hinder full implementation [4].

In Yemen, diabetes is an increasing public health issue, but there is limited research on how well physicians are adhering to the national guidelines. This study, conducted in July 2023, aimed to assess the level of awareness and adherence to the national diabetes management guidelines among physicians in Aden, Yemen. Specifically, it sought to evaluate how familiar physicians are with these guidelines, their level of confidence in implementing them, and the barriers they face in clinical practice.

METHODOLOGY

Study Design

A cross-sectional survey was conducted among physicians working in hospitals in Aden, Yemen, in July 2023. The survey was designed to assess physicians' knowledge, adherence, and attitudes toward the national diabetes management guidelines.

Participants

A total of 115 physicians participated in the survey, including general practitioners, internal medicine specialists, and endocrinologists. They were selected from both public and private hospitals in Aden, Yemen to ensure diverse representation.

Survey Instrument

The survey consisted of 14 questions, designed to assess:

- Familiarity with the national guidelines.
- Frequency of review and updates.
- Confidence in guideline implementation.
- Barriers to implementation and adherence.

Sample Size Calculation

The sample size for this study was determined using a standard formula for estimating proportions in a finite population:

$n = Z^2 \cdot p \cdot (1-p) / E^2$

Where:

- **n** = sample size,
- **Z** = Z-value (1.96 for a 95% confidence level),
- **p** = estimated proportion of physicians adhering to the diabetes guidelines (0.5, which gives the maximum sample size),
- **E** = margin of error (0.05).

Substituting values into the formula:

$n = 1.96^2 \times 0.5 (1-0.5) / 0.05^2 = 384$

Given the total number of physicians working in hospitals in Aden is relatively small (approximately 300-350), a finite population correction (FPC) was applied:

$n_{adj} = n / 1 + (n-1) / N$

Where:

- **n adj** = adjusted sample size,

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- **N** = total number of physicians in the study population (estimated at 350).
- n adj= 384 / 1+ (384−1)/350 ≈ 115

Thus, the calculated sample size required for the study was 115 physicians. This was the final sample size used for the survey

Data Collection Procedure

Data collection was conducted in July 2023, through a structured self-administered questionnaire. The survey was distributed to 115 physicians working in various hospitals across Aden. The questionnaire included 14 questions designed to assess:

- Familiarity with national diabetes management guidelines,
- Frequency of guideline review and update,
- Confidence in implementing the guidelines in practice,
- Barriers to following the guidelines,
- Perceived benefits of adherence.

The responses were measured on a Likert scale from "Strongly agree" to "Disagree."

Each physician received a paper-based version of the survey and was instructed to complete the questionnaire anonymously. A trained research assistant was available to assist with any questions regarding the survey but did not influence responses. To maximize the response rate, reminder emails and phone calls were made to encourage participation. The data was collected anonymously to ensure confidentiality and reduce response bias. After completion, the questionnaires were returned to the research team, where the data was entered into a secure database for analysis.

Ethical Approval

Ethical approval for this study was obtained from the Ethical Review Board of the University of Science and Technology, Aden, Yemen, prior to data collection (Approval (MEC -AD057) . All participants were provided with an information sheet outlining the purpose of the study, and written informed consent was obtained from each participant before the survey. Participation was voluntary, and physicians were assured that their responses would remain confidential and anonymous. The study adhered to ethical principles in accordance with the Declaration of Helsinki (World Medical Association, 2013).

Statistical Analysis

Descriptive statistics were used to analyze the data using SPSS version 23. Frequency distributions and percentages were calculated for each question to assess overall trends in awareness and adherence to the guidelines.

RESULTS

Demographic Data

The study included 115 physicians from various hospitals in Aden, Yemen. The gender distribution of the sample showed that 70 physicians (60.9%) were male, and 45 (39.1%) were female. Regarding the working area, the majority of respondents (85 physicians, 73.9%) worked in city-based hospitals, while 30 (26.1%) practiced in village settings. In terms of age, most of the respondents (105 physicians, 91.3%) were adults aged 60 years or younger, while 10 physicians (8.7%) were classified as elderly (aged over 60). The years of experience among the participants were fairly evenly distributed. 45 physicians (39.1%) had less than 5 years of experience, while 70 physicians (60.9%) had more than 5 years of professional experience. Finally, regarding specialization, 65 physicians (56.5%) were specialists, including endocrinologists and internal medicine physicians, while 50 (43.5%) were general practitioners.

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Table 1: Demographic Characteristics of the 115 Participating Physicians

Demographic Variable	Category	Frequency (%)
Gender	Male	70 (60.9%)
	Female	45 (39.1%)
Working Area	City	85 (73.9%)
	Village	30 (26.1%)
Age	Adult (≤ 60 years)	105 (91.3%)
	Elderly (> 60 years)	10 (8.7%)
Years of Experience	≤ 5 years	45 (39.1%)
	> 5 years	70 (60.9%)
Specialty	Specialized (Endocrinologists, Internal Medicine)	65 (56.5%)
	Non-specialized (General Practitioners)	50 (43.5%)

Awareness and Adherence to Guidelines

The survey results show that the majority of physicians are familiar with the national diabetes management guidelines, with 68% expressing awareness. A strong majority (93%) adhere to the guidelines for most of their patients, and 67% believe the guidelines improve patient outcomes. Physicians are generally confident in implementing the guidelines (75%) and feel that they play a significant role in enhancing the quality of patient care (89%). However, 12% reported limited familiarity with the guidelines, and 77% acknowledged encountering barriers to full implementation, such as resource constraints.

Table 2: Physicians' Awareness, Adherence, and Attitudes Toward National Diabetes Management Guidelines (n=115)

Question	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)
Q1: Familiar with national guidelines for diabetes management?	26%	42%	20%	12%
Q2: Regularly review and update knowledge of guidelines?	22%	40%	27%	6%
Q3: Believe guidelines are essential for improving patient outcomes?	33%	34%	27%	6%
Q4: Confident in ability to implement guidelines for patients?	32%	43%	16%	9%
Q5: Follow guidelines for most of my patients?	25%	68%	3%	4%
Q6: Consider individual patient factors when following guidelines?	16%	52%	21%	11%
Q7: Feel comfortable discussing guidelines with patients?	26%	45%	22%	7%
Q8: Believe guidelines are practical and achievable for most patients?	27%	46%	21%	6%
Q9: Encounter significant barriers to guideline implementation?	30%	47%	19%	4%
Q10: Availability of resources to support guideline implementation?	23%	38%	20%	19%
Q11: Further education on guidelines would be beneficial?	30%	44%	18%	8%
Q12: Interested in programs to promote adherence?	27%	45%	21%	7%
Q13: Believe guidelines improve patient care quality?	39%	50%	21%	7%
Q14: Confident that guidelines will evolve and improve?	44%	46%	9%	1%

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DISCUSSION

This observational survey focuses on the awareness and adherence to diabetes management guidelines among physicians in Aden, Yemen. It also compares these findings with similar studies conducted in different regions, highlighting some interesting trends in the demographic factors of the participants, such as gender, age, experience, and specialization.

One of the notable features of this study is the gender imbalance among the participating physicians. There were more male physicians than female participants, which is a pattern observed in many parts of the world. In many countries, particularly in regions with cultural and socio-economic constraints, women often have fewer opportunities to pursue careers in fields like medicine. This imbalance can also influence healthcare delivery, especially when it comes to managing chronic conditions such as diabetes. For example, studies from Saudi Arabia [5] reflect a similar gender disparity in the healthcare sector, which can contribute to unequal representation in the management of healthcare conditions, including diabetes.

Working area also played a significant role in the study's results. Most physicians in Yemen were based in urban centers, reflecting a common trend in many developing countries. In these countries, healthcare resources and professionals are often concentrated in cities, leaving rural areas underserved. The Ozdemir et al. ([6] study also found that urbanization tends to lead to such imbalances, which can limit access to effective healthcare in rural areas. This urban focus in the sample means the findings may not fully apply to rural areas, where healthcare providers might face unique challenges due to fewer resources.

When we look at the age of the participants, a trend emerges: a large proportion of the physicians were younger and had less than five years of experience. This is in line with global patterns where younger doctors are more likely to be active in clinical practice. Studies, such as one by Hoorn, C. J. G. M et al. [7], have shown that younger physicians are generally more open to adopting new technologies and treatment guidelines, which could explain why this group of physicians demonstrated higher adherence to diabetes management guidelines compared to older physicians.

The study also found a higher representation of specialists, particularly endocrinologists and internal medicine specialists. Specialists are more likely to be familiar with the complexities of managing chronic conditions like diabetes and are more likely to follow evidence-based guidelines. This finding is supported by Poudel et al. [8], which found that specialists tend to adhere more strictly to clinical guidelines than general practitioners. However, this study was different from another study published by Zhang, Y et al. [9] in Australia which revealed opposite finding in which general practitioners were more likely to follow guidelines and use more rapid.

In terms of adherence to diabetes guidelines, the Yemen study showed a relatively high level of awareness and compliance. Around 93% of physicians were aware of the national diabetes management guidelines, and 75% of them fully implemented them. This is particularly impressive considering the challenges faced by healthcare systems in low-income settings. For comparison, a study in India by Mohan et al. [4] found that 70% of physicians were aware of the guidelines, but only 50% adhered to them. The higher adherence rate in Yemen suggests that, despite resource constraints, the country's healthcare system might be somewhat better structured to support physicians in following guidelines.

On the other hand, a study in France by Casanova, L., et al., [10] reported that majority +of physicians adhered to diabetes guidelines, with 75% feeling confident in their ability to implement them. The difference in adherence rates could be partly due to the advanced decision support tools and electronic health records (EHR) available in the U.S. healthcare system, which are likely absent in Yemen, making it more challenging for physicians to implement guidelines fully.

Despite the high adherence in Yemen, the study identified some barriers. For instance, 61% of

physicians reported insufficient resources, which is a common issue in low-income settings. Brown, M. T., & Bussell, J. K. [11] identified similar challenges in their study, including limited access to medications and diagnostic tools. Patient-related issues, like non-compliance, were also noted as barriers to full guideline implementation, a problem similarly observed in the U.S. study.

Interestingly, a significant number of Yemeni physicians (74%) expressed a desire for further professional development, and 72% showed interest in attending programs to improve adherence to guidelines. This demonstrates a strong recognition among Yemeni physicians of the importance of continuous education, especially in a field as dynamic as diabetes care. Similar results were found in Sudan by Abdelgadir, H. S et al. [12] , where regular training was highlighted as a key factor in improving adherence to clinical hypertension guidelines, particularly in regions with gaps in medical education.

This study, therefore, highlights the challenges and successes in diabetes management in Yemen. Despite resource limitations, Yemen shows a relatively high level of awareness and adherence to diabetes management guidelines, though there are significant areas for improvement, particularly with regard to resources, training, and patient compliance. The desire for continuous professional development suggests that physicians in Yemen are eager to improve their practice and better manage chronic conditions like diabetes.

CONCLUSION

In conclusion, the findings of this study offer valuable insights into the awareness and adherence to diabetes management guidelines in Aden, Yemen. The study's strengths lie in its comprehensive demographic representation, which captures both young and experienced physicians and those from specialized fields. However, challenges such as resource limitations, insufficient training, and patient factors hinder the full implementation of the guidelines. The comparison with studies from India and the United States highlights both commonalities and differences in the barriers faced by physicians in different settings. Despite these challenges, the high level of awareness and the optimism among physicians regarding future improvements in diabetes care suggest that there is potential for continued progress in the region.

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