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Are patients affected by chronic non-communicable diseases aware of their own clinical and laboratory parameters? A cross-sectional study from the south of Saudi Arabia

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ABSTRACT

Background: Patient's awareness of their clinical and laboratory parameters is an indicator of the degree of involvement in achieving their management goals. This investigation aimed to identify awareness of patients affected by chronic non-communicable diseases of their clinical and laboratory parameters and factors associated with the awareness.

Methods: This study was a cross-sectional investigation conducted in the Jazan region, between January and August 2020. Data was collected during phone interviews utilizing a semi-structured questionnaire. Odds ratios (ORs) were calculated to estimate the likelihood of awareness of each clinical and laboratory parameter according to the measured demographic variables.

Results: The total number of recruited patients was 675. The mean age of participants was 53.7 years and the 28.7% of patients were illiterate. About 17% of the patient do not attend follow-up visits to any health-care provider. When patients were asked about their parameters, 87% of them were able to report their body weight and 74% were able to report their height. However, less than half of patients were aware of their glycated hemoglobin level (HbA1c) (271/675 patients) and systolic blood pressure (BP) level (329/675 patients), and a minority were aware of their total cholesterol level (71/675 patients). Being female, resident in a rural area, illiterate, and older than 53 was strongly associated with high odds of limited awareness about their own clinical and laboratory parameters (P values < 0.05).

Conclusion: Awareness of patients affected by chronic non-communicable diseases of their own clinical and laboratory parameters in the Jazan region is sub-optimal where this limited awareness is likely to be associated with the lower engagement of patients with achieving their desired management targets.

1. Introduction

The sufficient involvement, motivation, and commitment of patients regarding their disease management plan can have an impact on the overall control of their condition. Better involvement of patients with their plan requires them to become active participants in the healthcare process rather than passive recipients of care. This shift toward patient-centered healthcare may increase a patient's engagement and satisfaction with the delivery of their overall care (Catalyst, 2017). Additionally, patient-centered healthcare involves the creation of a partnership between the patient and treating physicians (Mitka, 2012).

Abbreviations: BP, Blood Pressure; CIs, Confidence Intervals; FBG, Fasting Blood Glucose; HbA1c, Glycated hemoglobin; HDL, High Density Lipoprotein; LDL, Low Density Lipoprotein; OR, Odds Ratio; PHC, Primary Healthcare Centre; RBG, Random Blood Glucose; SD, Standard Deviation; SPSS, Statistical Package for Social Sciences.

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Patients affected by chronic diseases require an active and long-term partnership with their physicians. This partnership should involve the creation of management goals, along with the strategies required to achieve these goals, with the emphasis on patients taking charge of their own health (Greene et al., 2016). Patient awareness of the seriousness of their condition can provide motivation to move from the precontemplation phase towards more active involvement and help to strengthen the partnership between a patient and their treatment team (Miller and Rose, 2009).

Patients suffering from chronic non-communicable diseases, such as diabetes, hypertension, dyslipidemia, and obesity, can benefit from pharmacological and non-pharmacological treatment options. To ensure the effectiveness of any management plan, patients are required to undergo continuous assessment of their clinical and laboratory parameters, including changes in body weight, waist circumference, blood pressure levels, blood glucose levels, and lipid profile. It is possible to argue that a patient's awarness of their clinical and laboratory parameters is an important element of patient-centered healthcare.

Saudi Arabia is a high-income, developing country with an increased prevalence of chronic non-communicable diseases. The prevalence of these conditions has been reported as increasing among older Saudi citizens. For example, about half of Saudis over the age of 65 have been reported as affected by diabetes (Saudi MoH, 2013). Additionally, chronic non-communicable diseases are a major contributor to overall death rates in Saudi Arabia and account for 73% of all deaths in the country (WHO, 2018).

There have been multiple studies conducted in Saudi Arabia measuring the awareness of diabetes, hypertension, and dyslipidemia. These studies indicated a sub-optimal level of awareness of these chronic non-communicable diseases among healthy subjects and those who are affected (Saeed et al., 2011; Arnous et al., 2019; Alanazi et al., 2018; Alzahrani et al., 2020). However, studies assessing the awareness of patients suffering from diabetes, hypertension, dyslipidemia, and obesity of their own clinical and laboratory parameters in Saudi Arabia are currently lacking. In this study, we hypothesize that a patient's awareness of these parameters is an indicator of the degree of involvement in achieving their management goals, as well as the quality of a patient's partnership with their treating physicians. We aim to identify the degree of awareness of patients in the Jazan region, and affected by diabetes, hypertension, dyslipidemia, or obesity, of their clinical and laboratory parameters and factors associated with that awareness.

2. Materials and Methods

2.1. Study context

This study was a cross-sectional investigation conducted in the Jazan region, in the Southwest of Saudi Arabia, between January and August 2020. This investigation was conducted as part of a project to evaluate utilization of preventive services for the control of chronic non-communicable diseases in this region, including tertiary prevention among patients affected by and being treated for diabetes, hypertension, dyslipidemia, and obesity. The ethical approval to conduct the project was granted via the Standing Committee for Scientific Research Ethics in Jazan University, with approval number REC 40/3–090, in addition to the administrative approval granted via Directory of Public Health in the Jazan Region."

Healthcare services, including preventive and curative services, in Saudi Arabia are provided by different governmental and private sectors. However, the majority of healthcare services in the country are provided by the Saudi Ministry of Health (Almalki et al., 2011). Saudi Patients suffering from chronic non-communicable diseases can benefit from the freely available healthcare services provided in PHCs, hospitals and specialized centers. Nonetheless, the main context of the study was related to PHCs as main provider of healthcare services for patients affected with the targeted conditions. Though data collection phase was completed during the peak of COVID-19 pandemic, data collection process was not affected as the stage visiting the selected PHCs was completed before March 2020 and followed by the recruitment which was completed via phone interviews.

2.2. Data collection tool

Data was collected during phone interviews utilizing a semi-structured questionnaire. The developed questionnaire was composed of a demographic section, which included age, gender, and area of residence. Patients were asked about their diagnosed condition, and the location of their follow-up appointments. Finally, patients were asked about the latest clinical and laboratory parameters they were familiar with, including their latest body weight, height, waist circumference, fasting blood glucose (FBG), random blood glucose (RBG), glycated hemoglobin (HbA1c), total cholesterol, low density lipoprotein (LDL), high density lipoprotein (HDL), and triglycerides.

The validity and reliability of the developed questionnaire was tested by different steps. First, the questionnaire was reviewed by a consultant in family medicine who tested its comprehensiveness in measuring the variables needed to answer the study's question. Additionally, it was piloted on a sample of 10 patients suffering from the targeted diseases to test its clarity, suitability, and the time needed to complete the interview. Finally, the reliability of the tool was tested via estimating the Cronbach Alpha coefficient. The estimated coefficient of items assessing awareness of clinical and laboratory parameters was 0.709 indicating a reasonable internal consistency of the measurement tool.

2.3. Data collection process

After securing administrative approval to conduct the study in the region's PHCs from the Directory of Health in Jazan, several PHCs were visited and the study information letter was shared with each center's administration. This facilitated advertising the study to visiting patients. No specific random sampling technique was utilized in this investigation. Adult patients diagnosed with diabetes, hypertension, dyslipidemia, or obesity, and interested in volunteering to participate, were able to directly contact the research team via the advertised contacting details, have the research objectives and process explained to them, and arrange for the recruitment. During the recruitment phase, the questionnaire was completed via phone interview after verbal consent had been secured. Conducting phone interviews was necessary as a section of the study's targeted population was expected to be illiterate and, therefore, not able to complete self-administered questionnaires. Subjects not diagnosed with diabetes, hypertension, dyslipidemia or obesity, subjects who were under 18, and those who did not agree to participate, or did not complete the interview were excluded.

It was expected that some patients affected by chronic non-communicable diseases do not attend their follow-up sessions. This added a difficulty to the recruitment process and subjected the study to the possibility of selection bias. To overcome this obstacle, and to reduce the possibility of bias, patients who completed the recruitment process were asked to advertise the study in their community settings. Utilizing non-random snowball sam-

pling enabled the recruitment of patients who do not attend follow-up sessions.

All phone interviews were collected via trained medical students or medical residents. To ensure consistency in the interview process, training sessions were conducted on carrying out interviews via the standardized developed questionnaire. Furthermore, the pilot study enabled assessment of the quality of data collected via each interviewer prior to the actual initiation of the study. The required sample size to complete the study was assessed after consulting the relevant literature. According to the Saudi Health Interview Survey, the prevalence of diabetes, hypertension, obesity, and dyslipidemia in the adult Saudi population varies between 8.5% and 28.7%. Four different sample sizes were estimated and the highest estimate was generated via using the prevalence of 28.7%. The required sample size was estimated via the STATCAL function of Epi Info software. Assuming a 5% margin of error and 99% confidence level, a total of 651 patients was required, after adding 20%, due to the assumption a proportion of patients would refuse to complete the interview.

2.4. Data analysis

SPSS Statistics software (version 25) was used to perform the statistical analysis of this investigation. Demographic variables were summarized via frequency and proportion if they were binary and categorical, and with mean and standard deviation (SD) if they were continuous. Similarly, frequency and proportion were used to degree of patients awareness of their clinical and laboratory parameters.

To investigate the association between demographic variables and the patients' awareness of their clinical and laboratory parameters, Odds Ratios (ORs) and 95% Confidence Intervals (CIs) were calculated to estimate the likelihood of awareness of each clinical and laboratory parameter according to each demographic variable. The odds were tested depending on a binary grouping of awareness (aware versus not aware), gender (male versus females), age (under 53 versus older), education (illiterate versus educated), area (rural versus urban), and comorbidities (one diagnosed condition versus more than one). Age was grouped utilizing the mean of 53 as a cut-off point. In this univariate logistic regression, awareness was presumed as a dependent variables and the demographic variables were presumed as independent variables. A p value of 0.05 or less was presumed statistically significant for the calculated odds ratio.

3. Results

A total of 739 patients were identified and approached for this investigation. After the exclusion of 64 patients who were either under 18, refused to participate, or did not complete the interview, the total number of recruited patients was 675, registered with 65 PHCs in the region. The total identified number of patients was higher than the estimated sample size despite expecting a 20% non-response rate. This can be explained via the utilization of non-random, community-based, snowball sampling resulting in higher number of patients volunteering to participate than the required number of patients. Demographic data on the included patients are displayed in Table 1.

The age of participants varied between 18 and 95, with a mean of 53.7 years. The proportion of male and female patients was similar, and the majority of patients were illiterate (28.7%) and owned their own residence (98.9%). The proportion of patients living in rural areas was slightly higher (54%). The majority of patients were diagnosed with either diabetes or hypertension, and almost 40% of the sample was affected by more than one condition. Finally, 116 (17.2%) reported no follow-up for their diagnosed conditions, while approximately 58% of patients reported follow-ups in a PHC settings.

Table 1
Demographics of 675 patients diagnosed with a chronic non-communicable disease from the Jazan region, Southwest of Saudi Arabia:

	Frequency [Proportions%]
Age: mean [SD]	53.7 [13.4]
Age: groups	
< 40	103 [15.3]
40 - < 50	112 [16.6]
50- < 60	212 [31.4]
60 - < 70	160 [23.7]
> 70	88 [13]
Gender	
Male	345 [51.1]
Female	330 [48.9]
Education level	
Illiterate	194 [28.7]
Primary	129 [19.1]
Middle	50 [7.4]
Secondary	125 [18.5]
Bachelor/Diploma	174 [25.8]
Master's/PhD	3 [0.4]
Type of residence	
Owned	607 [98.9]
Rented	68 [10.1]
Area of residence	
Urban	308 [45.6]
Rural	367 [54.4]
Diagnosed condition*	
Diabetes	462 [68.4]
Hypertension	423 [62.8]
Dyslipidemia	102 [15.1]
Obesity	25 [3.7]
Patient diagnosed with more than one condition	
Two conditions	208 [30.8]
Three conditions	58 [8.6]
Four conditions	5 [0.7]
Location of follow-up	
No follow-up	116 [17.2]
PHC	391 [57.9]
Hospital	90 [13.3]
Diabetes center	54 [8]
Private sector	24 [3.6]

* Patients were able to select more than one condition.

Table 2 illustrates the frequency and proportion of patients who were able to report their own clinical and laboratory parameters during the interviews. The most frequently reported parameter was latest body weight, followed by height. Almost half of the participants were not aware of their latest FBG, latest RBG, or blood pressure levels. Finally, 5% or less of the participants were aware

Table 2
Awareness of 675 patients diagnosed with a chronic non-communicable disease from the Jazan region, Southwest of Saudi Arabia, of their latest clinical and laboratory parameters:

Clinical and Laboratory Parameters	Frequency [proportions] of those who were able to report their parameters
Body weight	586 [86.8]
Height	496 [73.5]
Waist circumference	36 [5.3]
Latest FBG	328 [48.6]
Latest RBG	348 [51.6]
Latest HbA1c	271 [40.1]
Latest diastolic BP	320 [47.3]
Latest systolic BP	329 [48.7]
Latest total cholesterol	71 [10.5]
Latest LDL	21 [3.1]
Latest HDL	20 [3]
Latest triglycerides	27 [4]

of their waist circumference or their lipid profile. This indicates a sub-optimal awareness among patients suffering from chronic diseases in the Jazan region of their clinical and laboratory measurements.

The influence of demographic factors on the level of awareness of recruited patients of their clinical and laboratory parameters is displayed in Table 3. It seems that residence in rural areas was associated with a lower level of awareness. Residents in rural areas were less likely to know their latest body weight, waist circumference, HbA1c, blood pressure level, and their lipid profiles (P values < 0.05). It is possible to argue that the difficulty for rural patients in accessing healthcare services is partially responsible for lower awareness of these parameters in comparison to urban patients.

In addition to area of residence, education seems to have a significant influence on the awareness of patients of their clinical and laboratory parameters. Patients who were illiterate were less likely to know their own body weight, height, FBG, RBG, or HbA1c (P values < 0.05). Being a male was associated with higher odds of awareness of body weight, height, FBG (P values < 0.05) and being younger than 53 was associated with higher odds of awareness of body weight, height, waist circumference and RBG (P values < 0.05). Finally, having more than one diagnosed condition was associated with higher awareness of FBG, RBG, and blood pressure (P values < 0.05). However, having one condition was associated with higher odds of awareness of height (P values < 0.05) and body weight (marginal significance).

4. Discussion

In this cross-sectional study, the awareness of patients affected by either diabetes, hypertension, dyslipidemia, or obesity of their clinical and laboratory parameters was assessed. It was found that 17% of this sample do not attend follow-up visits to any healthcare provider in the region. The majority of patients demonstrated awareness of their own body weight and height. However, a lower proportion of patients were aware of their blood glucose parameters and blood pressure levels, and a minority were aware about their lipid profile. Being female, resident in a rural area, illiterate, and older than 53 was strongly associated with high odds of limited awareness about their own clinical and laboratory parameters.

Studies conducted with a similar scope and approach in the greater Saudi community are currently lacking. However, it is possible to compare the findings of our investigation with various studies assessing the level of knowledge and practices concerning individual chronic non-communicable diseases. In general, the limited awareness of patients recruited in our sample is consistent with that identified in previous investigations conducted in Saudi Arabia. For example, in a systematic review involving 19 studies that measured the level of diabetes awareness, it was concluded that there was a need to increase awareness about the disease and a need to integrate these efforts into healthcare delivery systems to ensure the better knowledge of patients, family, and the community (Alanazi et al., 2018). Additionally, in a study conducted in Taif city, Saudi Arabia, and involving a total of 264 diabetes patients, it was reported that 44.3% of the sample did not know what HbA1c was (Almalki et al., 2018). This is similar to the findings of our study, with approximately 60% of our sample not knowing their HbA1c level.

Our study indicated that older subjects were less likely to be aware of their own clinical and laboratory parameters. In addition to the odds of being illiterate among the elderly, this limited awareness can be partially explained by the elderly's difficulty in accessing health care facilities in the region. This explanation is supported by the findings of a cross-sectional study assessing indicators of clinical services in 15 PHCs in Riyadh, Saudi Arabia. This indicated that a lack of public transport, limited parking, and limited ramps and handrails have led to an overall difficulty in access among this age group (Alhamdan et al., 2015).

It is possible to postulate that factors leading to a lower utilization of PHCs can have a negative impact on delivery of health care services and lower the motivation of patients to engage in their own management plans. In addition to the possible access difficulties the elderly can face, PHCs can have variability in their infrastructure, leading to a variability in delivery of health care for patients affected by chronic non-communicable diseases. For example, in a study conducted in the Aseer region, and involving 242 technical directors working in the region's PHCs, it was reported that the laboratory resources required for parameter measurements needed for diabetic patient follow-ups were limited (Al-Khaldi and Al-Sharif, 2002). In our study, around 60% of patients reported having their follow-up sessions at PHCs in the region, and it is possible to argue that the limited awareness of patients about their clinical parameters can be partially explained by the limited laboratory infrastructure of these PHCs. Additionally, this can be further complicated by the likely difficulty in transferring patients from PHCs to other secondary and tertiary health care facilities equipped with the required laboratory resources (Gosadi, 2020).

Table 3
Univariate logistic regression of the association between demographic factors and awareness of 675 patients diagnosed with a chronic non-communicable diseases from the Jazan region, Saudi Arabia, of their latest clinical and laboratory parameters:

		Demographic variables [reference group]				
		Gender [females]	Age [>53 years]	Education [illiterate]	Area [rural]	Number of conditions [one condition]
ORs [95% CI] of awareness of clinical and laboratory parameters	Body weight	**2.1 [1.3–3.4]***	**3.3 [1.9–5.5]***	**4.9 [3.1–7.8]***	**1.7 [1.1–2.8]**	0.6 [0.4–1.1]
	Height	**2.7 [1.9–3.9]***	**2.3 [1.6–3.3]***	**3.6 [2.5–5.2]***	1.3 [0.9–1.9]	**0.6 [0.4–0.8]***
	WC	1.07 [0.5–2.1]	**2.2 [1.1–4.4]***	2.6 [0.9–6.7]	**2.8 [1.3–5.9]***	1.2 [0.6–2.3]
	FBG	**1.5 [1.1–2.1]***	1.04 [0.7–1.4]	**1.4 [1.1–2.1]***	1.1 [0.8–1.6]	**1.5 [1.2–2.1]***
	RBG	1.3 [0.9–1.7]	**1.3 [1–1.8]***	**1.7 [1.2–2.5]***	1.1 [0.8–1.6]	**1.4 [1–1.9]***
	HbA1c	**2.09 [1.5–2.8]***	1.2 [0.9–1.7]	**2.5 [1.7–3.6]***	**1.7 [1.2–2.3]***	1.4 [0.8–1.5]
	Diastolic BP	0.8 [0.6–1.1]	0.8 [0.6–1.1]	0.8 [0.6–1.2]	**1.5 [1.6–2.1]***	**1.8 [1.3–2.5]***
	Systolic BP	0.9 [0.7–1.2]	0.8 [0.6–1.1]	0.9 [0.6–1.3]	**1.6 [1.1–2.1]***	**1.9 [1.4–2.6]***
	Cholesterol	1.4 [0.8–2.3]	0.7 [0.4–1.2]	1.5 [0.8–2.8]	**4.7 [2.6–8.5]***	1 [0.6–1.7]
	LDL	0.8 [0.3–2.1]	1.6 [0.6–3.9]	1 [0.3–2.6]	**7.5 [2.1–25.8]***	0.9 [0.3–2.2]
	HDL	0.7 [0.3–1.8]	1.4 [0.6–3.6]	0.9 [0.3–2.4]	**7 [2.1–24.4]***	0.6 [0.2–1.6]
	Triglycerides	0.6 [0.2–1.4]	1.3 [0.6–2.8]	0.7 [0.3–1.8]	**2.9 [1.2–6.8]***	1 [0.4–2.1]

* ORs with p value of<0.05.

Limited awareness of the patients of their clinical and laboratory parameters can be related to the delivery of health care rather than the attitude of the patients toward their parameters. In a study conducted in PHC settings in Saudi Arabia and involving the review of medical records of 450 patients suffering from type 2 diabetes, it was concluded that there was a suboptimal adherence to diabetes management guidelines. For example, adherence rate to the clinical standard for measurement of HbA1c was 68%, and 56% for measurement of HDL (Al Harbi et al., 2015).

The influence of age, education level and area of residence on the overall level of awareness of clinical and laboratory parameters identified in our investigation is consistent with the findings of other international investigations assessing factors influencing overall knowledge about chronic non-communicable diseases (Mirmiran et al., 2010; Rahaman et al., 2017; Prenissl et al., 2019). It can be noted that these demographic factors have a significant impact on the management of patients affected by chronic non-communicable disease and their degree of involvement. It is possible to argue that those who are illiterate, elderly and residents in rural areas are a vulnerable group and the key health message to be summarized here is to ensure the development of strategies to increase this vulnerable group's awareness of the parameters involved. This may lead to a greater involvement, motivation, and commitment of these patients regarding their management plan and follow-up indicators.

This study had multiple strengths and limitations. The investigation utilized a semi-structured questionnaire completed during interviews, which enabled recruitment of an important sample of illiterate patients. Additionally, using a snowball approach enabled contact with those patients who do not attend follow-up appointments at any healthcare delivery location. The limitations of this study were mainly related to the subjective nature of the questionnaire, with patients directly asked about their clinical and laboratory parameters rather than using retrieval of their medical records. However, the scope of this paper was related to the patients' awareness of parameters rather than the actual parameters themselves. Additionally, the use of non-random sampling may have subjected the findings of our investigation to sampling bias.

5. Conclusion

Awareness of patients affected by chronic non-communicable diseases of their own clinical and laboratory parameters in the Jazan region is sub-optimal. Awareness levels were found to be highly influenced by age, education level and area of residence. It is expected that this limited awareness is likely to be associated with the lower engagement of patients with achieving their desired management targets and, subsequently, lower adherence to practices aiming to control these conditions and reduce incidence of complications. The development of strategies to ensure patient-centered care and higher engagement with management plans among those suffering from chronic non-communicable diseases in the region is an area for further research and assessment.

Contributors:

IG: Study concept and drafting of manuscript.
KD: Study design and analysis.
AO: Data analysis.
AN: Data collection and analysis.
AK: Drafting and revision of manuscript.
MM: data collection and analysis.
MA: Drafting and revision of manuscript.
HM: Drafting and revision of manuscript.
AS: Data collection tool development.

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Nothing to declare.

Declaration Competing Interest

None.

Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.sjbs.2021.02.032.

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