Health Status Evaluation of Type 2 Diabetics from Two Northern Hospitals of Peru

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Abstract

Objective: To describe illness related knowledge features, mental health, adherence to therapy and quality of life on type 2 diabetics from two northern hospitals from Peru.

Material and methods: Cross sectional descriptive study. A cense was made. Descriptive statistics and exploratory analysis were employed.

Results: there were 382 diabetic patients: 289 in Lambayeque and 93 in Piura:112 people were interviewed. The mean age was 59.5 +/- 11.6 years, 58% were women, 59% were from Piura, 43.8% only had primary school and 41.5% reffered 2 to 4 outpatient evaluation in the last two years; 28,6% referred to have been infected by COVID-19: 35,5% in Lambayeque and 23,8% in Piura; 17.8% had poor illness related knowledge's. About mental health, 62.5% had Depression, 93.8% Anxiety (severe in 80.3%) and 57.1%, both; 50.6% had adequate adherence to therapy. The median of quality of life was 161.5 (IQR=127.1-215) and 24.1% had poor quality of life. In descending order, the more affected dimensions of quality of life were: "control of diabetes", "Energy and mobility", "Social charge", "anxiety" and "sexual performance". In the exploratory multivariate analysis only anxiety was associated with poor quality of life.

Conclusion: illness related knowledge features, mental health, adherence to therapy and quality of life were poor on type 2 diabetics from these two northern cities of Peru. Diabetic anxiety patients had poor quality of life.

Source: MeSH

Introduction

Type 2 Diabetes (T2D) continues to be a public health matter. It causes handicap as well as high illness costs and burden. On the world, there are more than 463 millions of people living with it (prevalence = 9.3%). It has a prevalence of 9.4% in Latin America and 22.7% in older than 65 years; more than 80% of deaths from diabetes occur in low and middle-income countries (1). The PERUDIAB 2012 study conducted in 1,677 homes nationwide, representative of more than 10 million adults over 25 years of age, has found a 7% prevalence of DBT in Peru, highest in the coast: 8.2% (2). Piura and Lambayeque are two important cities from the northern coast of Peru with 2'047,954 and 1,310,785 people, respectively (3).

In the other hand, T2D is a complex disease; its treatment and focus require a holistic model called Chronic Care Model (CCM). Proactive and multidisciplinary work, self-care support, adequate use of evidence-based medicine, information systems for healthcare staff and policies to ensure life-style changes and equity in the healthcare system are the bases (4). This model has proven to diminish cardiovascular complications and resulting mortality in a systematic review (5).

On the other side, ADA (American Diabetes Association) guidelines propose the *High-Quality Diabetes Self-Management Education and Support* (DSMES) as a measure to improve glycemic control, patient's satisfaction and diabetes self-management. This consists in the patient acquiring knowledge, abilities, decision making and problem-solving skills; and its founded on a multi-disciplinary team presence (6). Thus, an integral focus on the patient is important.

Also, mental health problems like anxiety and depression frequently co-exist with diabetes; they must be screened, diagnosed and treated in order to improve treatment adherence. Li, in 2006, found in 20,142 diabetics that anxiety life prevalence was 19,5%, being superior in Hispanics (7); not reaching glycemic objectives and insulin use have been listed as triggers. ADA suggests an annual depression screening, especially when therapeutic shifts or cardiovascular complications occur (8). Depression treatment can improve glycemic control. Moreover, an adequate treatment

adherence, proper knowledge regarding their illness and to consider the patient's life quality are CCM and DSMES focuses' pillars, proposed by ADA.

It is true the budget per results strategy rules locally and nationally, and since the chronic non-transmittable diseases' strategy gathers a larger number of patients, said patients' management tends to be inefficient and fragmented. The strategy contemplates educational tactics as well as a team conformed by different healthcare professionals, but there isn't an articulation of sorts nor leadership when it comes to its implementation or when measuring its effectivity in the local context. The lack of local data, the improvement opportunities with a better data management and favorable results in other systems as evidence contributes to the need for generating information. This study will allow to, initially, characterize diabetes patients from two great hospitals in the Northern Macrorregión's health status and manage their healthcare according to their data. The study's objective was to describe DBT patients from two hospitals at Northern Peru's health status during 2020

Material And Methods

Cross sectional descriptive study. Population consisted of patients attended by the chronic non-transmittable diseases' strategy from two peruvian Ministerio de Salud's hospitals: Regional Lambayeque, high complexity (Hospital 1), and Santa Rosa de Piura, medium complexity (Hospital 2); both of them are the most complex in their regions; and the statistics registries from both hospitals, the number of diabetics during 2018, was 1735 at Hospital 1 and 386 at Hospital 2; considering an adequate Diabetes knowledge frequency of 38% (previous study held at Hospital 1) (9), 95% confidence level, 5% significance level, the expected sample size was 326: 260 at Hospital 1 and 66 at Hospital 2. Nevertheless, in the diabetes strategy databank, only 280 phone numbers were registered at Hospital 1 and 93 at 2, so a census was held. Figure 1 depicts the participant selection process. For this study, "health status" was assigned to the following variables' descriptions: Diabetes Knowledge, Anxiety/Depression presence Diabetes related quality of Life, and pharmacological treatment adherence.

Diabetes knowledge:

A previously validated questionnaire at Hospital 1, was employed, consisting of 17 questions, a 0.76 Cronbach's alpha, categories being: Low (less than 50 percentile), moderate (p50-p75) and high (>p75) (9).

Depression and Anxiety:

Beck's inventories for each condition, validated in our country, were used (10). The depression one was validated in general medicine patients, with a 0,889 Cronbach's alpha, and has a Kaiser-Meyer-Olkin (KMO= 0.95) and a Bartlett's sphericity test ($\chi^2= 3603.2$, $p < .001$) for factorial analysis (11). Both inventories classified each patient with absent, low, moderate or severe depression; these inventories have been previously used by the author on diabetics at external consult in Lambayeque (12) (13).

Treatment adherence:

The Moriski Green questionnaire (14) was used, previously used in patients with DBT2 (15) and in a study in patients from Lambayeque (16). It has a Cronbach's alpha of 0.61; 94% specificity and 91.6% positive predictive value.

Diabetes related quality of life: The Diabetes 39 spanish questionnaire, validated in México in 260 Type 2 diabetics, was applied. It has 0,95 Crombach's alpha, and a test r upper than 0,7 with 39 items organized in 5 dimensions: Energy-Mobility:15 items, Diabetes control: 12 items; Anxiety: 4 items, social charge: 4 items and sexual function: 5 items (17). For the purpose of this investigation, percentiles 25th, 50th and 75th were calculated to describe low, moderate, high and very high quality of life. To explore association between quality of life and the other variables, the 50th percentile divided low and high quality of life.

Analysis

Of both diabetes strategies registers, patient's lists were solicited in order to obtain phone numbers and addresses; the dates and hours were settled with the patient/caretaker; 2 interviewers at Lambayeque and 1 at Piura carried out the visits, with personal protection implements at all times. For numeric variables; means, standard deviations, medians and interquartile ranks were calculated. To explore association between categorical variables, X^2 was employed and between numeric variables, student's T or Wilcoxon according to the variable's normality. The principal variable in the study was Quality of life, so, an association was explored with other variables and it. To explore association between quality of life and the other variables, the 50th percentile divided low and high quality of life. Stata 15 was used for data analysis.

Ethical aspects

Ethics approval and consent to participate

The project was approved by Hospital 1 Investigation ethics' Committee (Code: 0222-032-20 CEI). An informed consent was obtained of each patient; a format was handed; each patient received information about the project's objectives, information's confidentiality aspects, participation benefits and free evaluation.

Consent for publication

All participants were requested authorization to publish the results. In case of depression/anxiety, a visit to a mental health specialist was suggested.

A copy of the report was delivered to every diabetes strategy. All methods employed were carried out in accordance with current guidelines and regulations.

Results

In both hospitals, at the beginning of 2020, there were 382 diabetes patients: 289 in Lambayeque and 93 in Piura. Patient recruitment process is shown in **figure 1**;

Nine patients (2,35%) passed away, all of them from Lambayeque; 41/382 (10,7%), were living in another province, all of them from Lambayeque. In Lambayeque, 170/289 (58,8%) patients, didn't pick up the phone or the phone was shut down or the telephone number was incorrect, and in Piura: 24/93 (25,8%). Were interviewed 112 participants (29,3%). The mean age was 59.5 +/- 11.6 years, with a normal distribution (shapiro wilk = 0.4); 58% were women, 59% were from Piura, 43.8% only had primary school, 41.5% referred that had had 2-4 outpatient evaluation in the last two years;

36.6 % mentioned that had been hospitalized due to DBT in the last 2 years. The more frequent antecedent was high blood pressure: 55/112 (49.2%). Other results appear in **table 1**.

In Piura, 29/66 (43.6%) patients had more than 8 outpatient controls and in Lambayeque only 2/45 (4.4%), $p < 0,001$. There were not differences in sociodemographic variables quality of life, mental health, adherence and knowledges about DBT2 between the two cities. Glycemia value was present only in 64/112 (57.14%); the median was: 137 (IQR= 113-350) and glycated Hemoglobin was present in only 20/112 (17,8%). The median was: 8.6 (IQR= 6.7-12.9).

In illness related knowledge, 93.7%, 89.3% and 88.3% mentioned that *"Diabetes should be treated forever"*, it *"cannot be cured"* and that *"it is possible to control it"*. On the other hand, only 38.4%, 32.4% and 16.9%, knew the *"blood glucose value that define Diabetes"*, *"the way to cut toenails"* and that a diabetic patient *"could consume condiments in meals"*.

Table 2.

The 25th, 50th and 75th percentils of the questionnaire were: 12, 14 and 19, respectively; 44.6% had moderate level of knowledge. Only 37.46% had very high/high knowledge about their disease.

About mental health, 70 (62.5%) had Depression, 105 (93.8%) Anxiety and both: 64/112 (57.1%); 90 (80.3%) had severe anxiety; only 50.6% of the participants had adequate medication adherence.

The median of the quality of life was: 161.5 (IQR=127.15-215) and 24.1% had poor quality of life. **Table 3.**

In **table 4** appear the median and IQR of the dimensions of the scale.

When we corrected the value considering the number of items of each dimensions, we obtained that in descending order, the more affected were: "Diabetes control", then, "Energy and mobility", "Social charge", "anxiety and concern" and finally, "sexual performance".

Referred to have been infected by COVID-19: 32/112 (28,6%): 16/45 (35,5%) in Lambayeque and 16/67 (23,8%) in Piura; only one patient from Piura had a severe COVID-19 and was hospitalized.

In bivariate analysis had been hospitalized due DBT2 ($p=0,025$) and Anxiety ($p=0,057$) were associated with poor quality of life. In the exploratory multivariate analysis only Anxiety ($p<0,001$), was associated poor quality of life.

Discussion

Pandemic has modified patient's tracking and control from health strategies (18); the lack of external consult attention for chronic patients may have dilapidated their health. Its investigation is urgent.

It caught our attention the high "wrong telephone number" frequency, especially at Lambayeque; it could be attributed to a lousy valid data management resulting in a poor patient control. Lambayeque's Hospital was designed to gather the northern macro region demand, but has attended, at least before the pandemic, medium complexity pathologies. Moreover, it doesn't have an adjunct population like the Hospital of Piura, which could make data management a smoother process even with low budget. That suggests an exhaustive review of MINSA's Resolution N: 117–2020, related to telemedicine in pandemic times (19).

Low participation frequency (28,7%), which is usual on population studies, is vastly notorious. Infection fear is a possibility. The possible higher complexity of its patients could explain the significant difference in mortality and in foreign patients.

A concept called health literacy entails people's knowledge, competences and motivation and to understand and apply health information to take decisions for healthcare to improve quality of life and get a better health status. In this study, we did not measure this, but knowledges are an important issue of it; 17.8% had poor illness related knowledges and 37.4% high/very high knowledge. Abdullah in a systematic review of twenty-nine studies involving 13,457 patients with T2DM from seven countries, found that the prevalence of limited health literacy ranged from 7.3–82%, lowest in Switzerland and highest in Taiwan. In USA was 28.9% and 26–45% in Brazil. Although it is true these aren't the same concepts and that the instruments used were different, the findings are similar (20). It could suggest that people living with diabetes in these two cities may have an acceptable level of knowledges about their disease. It's a matter of future investigations. Also, health literacy is related to knowledges (21), and to treatment adherence (22).

It seems as patients were informed about theory aspects of T2DM: *it can't be cured, it can be control*. But some practice aspects such as: how to take care of their feet (57,7% and 32,2% of correct answers in both items) and characteristics of diet (fried foods: 64.3%, sweet meals: 54.5% and condiments in meals: 16.9%) didn't reach a high frequency of correct answers. This could tell us adequate practices are scarce. Nevertheless, they should be measured. Practices are much more difficult to test and must be measure in situ.

About mental health, 93.8% had Anxiety (severe in 80.3%). Amiri in 2019, in an systematic review of 23 studies, found that pooled odds ratio was: 1.48; (CI 95%= 1.27–1.74); in cross-sectional studies, the odds was = 1.50; (CI 95%= 1.26–1.77, and in prospective-cohort studies, it was = 1.34; 95% confidence interval = 1.21–1.49. In all the observational designs, Diabetes was an independent factor to develop anxiety (23). On the other hand, Smith in 2018, in another systematic review of prospective studies demonstrated patients with anxiety also were at more risk to develop T2DM. In total, 14 studies (n = 1'760, 800) examined anxiety as a risk factor for incident diabetes. The odds ratio found was 1.47 (CI = 1.23–1.75) (24).

About Depression, Anderson during 2001 in another systematic review, found that people with T2DM had double risk of having Depression when they were compared with general population (25).

International data suggest anxiety is more frequent than depression in T2DM. Constantino, during 2014 in Peru, in a national hospital from Lambayeque, found that frequencies of Anxiety and Depression were: 65.2% and 57.8%, and both: 57.8% (26). In our study the frequencies are higher (93.8% Anxiety) and (62.5% Depression); both: 57.1%. In both studies the Beck inventories were applied. It could be explained due to the pandemic. In fact, house confinement, social distancing and fear of getting infected could have altered life quality and spiked up depression and anxiety rates in this context. Alessi in Brazil, in 120 uncontrolled diabetics with a 21-year-old disease age and with a referred 42% of partial house confinement, found 42% of psychological distress (anxiety/depression symptoms), 29% of T2DM related emotional distress, 75% of sleep disorders and 7% of suicidal ideation (27).

Other reasons could be that both are different target populations (the first ones were from outpatient attendance), worsening of our mental health services or selection bias. It must be explored in another study.

Unfortunately, the problems founded in the laboratory registries didn't let us establish if there was an adequate glycemetic control. Constantino in the study mentioned, didn't find association between glycemetic control and depression (PR = 0.94, 95% CI 0.83–1.07, $p > 0.05$) and anxiety (PR = 0.95, 95% CI 0.77–1.16, $p > 0.05$) (26).

Actually, we have no data if chronic noncommunicable disease strategy in both hospitals, is supporting mental health strategies to assist their patients. It is a matter that should be investigated.

One of two patients were not adherent to medical therapy. Iglay in a systematic review during 2015, in 13 studies of T2D, found that 75.3% (CI = 68.8%-81.7%) had adequate adherence to oral therapy (28).

Carranza in diabetic foot amputees from Hospital 1, during 2018, found that 47.3% were adherent to pharmacological treatment (29). In another study Villalobos in 2017, in 218 primary care diabetics from Lambayeque, found a pharmacological adherence of 35.8% (16).

In spite of these last studies explore adherence in primary care and in people with evident target organ damage, findings are useful to explore the problem. Data suggest that in our region (northern coast from Peru), adherence is poor. Analytic observational studies or qualitative research to explore factors/ Cosmo vision (alcohol use? /believes) did not exist in our region and must be done. The worst the adherence the worst the future of the patients. Telemedicine and supporting of mental health problems could had an impact on this variable.

The median of quality of life was 161.5 (IQR = 127.1–215) and 24.1% had poor quality of life. “Diabetes control”, then, “Energy and mobility”, were the dimensions more affected. It could be interpreted that patients perceived they can’t control their and that they have physical limitations to do their activities. The fact that Energy and mobility area affected could mean that some amputated patients or patients with severe neuropathy have participated. Unfortunately, these variables were not considered. Mokhtari in a systematic review of 17 studies, with a sample size of 5472 patients from Iran, found that the dimension more affected was *physical*, and general health. This findings are very similar to ours. It could be because of the similarity of the populations. Nevertheless, the instruments used were different. In that study the instruments used were the *Health Related quality of life* and the SF-36. Their patients showed to have moderate quality of life (30). We found that one of two had moderate quality of life. It could suggest similarities in the populations.

Ozdemir, during 2017, in a cross-sectional study of 150 T2D patients with from an endocrinology clinic from Nigeria, found a statistically significant negative correlation between Beck Anxiety Score and the punctuations of the quality of life test (31).

Both, the Chronic Care Model (CCM) (5) and the *High-Quality Diabetes Self-Management Education and Support* (DSMES) (6) are constructs that are necessary to ensure an holistic care support for T2D; proactive and multidisciplinary work, self-, adequate use of evidence-based medicine, information systems for healthcare staff, policies to ensure life-style changes, equity in the healthcare system and presence of knowledge, abilities, decision making and problem-solving skills. The results of this study suggests we are diapers, yet. There is so much problems to afford and it is time to begin.

In our study, after considering all the variables in the multivariate analysis, only anxiety showed and independent association with poor quality of life. This is only an exploratory analysis because the sample size was not enough and the sampling method was not probabilistic. Neverthelless Anxiety was much more frequent that Depression, por adherence, poor level level of knowledges and other variables. So, we suggest it’s study should be prioritized over depression. It is crucial that psychological and psychiatric support be established as soon as posible.

On the other hand, this is the first peruvian study that evaluates he frequency of COVID infection in diabetics from the outpatient attendance: 28,6%: 35,5% in Lambayeque and 23,8% in Piura. In spite of the possibility it could be an interviewer bias, these numbers could be related to what is happening in the pandemic (32). At January the 18th, Lambayeque has 2,609 and Piura 2,169 cases per 100,000 inhabitants, so it could be explained because this numbers. Nevertheless, the data in this study only regards on the information given by people at home.

We must comment only 29.2% people were surveyed; most telephone numbers were wrong. These results are worrying, since Lambayeque Hospital has greater support from the Budget for Results (BFR) initiative of the Economy and Finance Ministry.

These characteristics complicate the picture, a reality that can exacerbate people's health status, due to the late identification of complications and comorbidities. The data management logistics shall be revised through qualitative studies in order to explore the patient and their families' perspective on telemedicine tracking. There is a need for more qualified human resources, since it has an impact on people's health and costs implied with complications.

Among the limitations we should mention the bias associated with trasversal studies and the problems of sampling, already mentioned.

Also, we didn't include the HbA1c of all the patients nor the weight, height or blood pressure controls, given the aforementioned restrictions.

Other limitation is that we did not measure if patients had Cardiac Insufficiency, amputations/diabetic foot that could alter these results.

In conclusion, illness related knowledge features, mental health, adherence to therapy and quality of life were poor on type 2 diabetics from these two northern cities of Peru. Diabetic anxiety patients had poor quality of life.

Declarations

1. Financing:

self-financed

2. Conflicts of interest:

the authors declare not having conflicts of interest.

3. Ethics approval and consent to participate:

The project was approved by Hospital 1 Investigation ethics' Committee (Code: 0222-032-20 CEI). An informed consent was obtained of each patient; a format was handed; each patient received information about the project's objectives, information's confidentiality aspects, participation benefits and free evaluation.

4. Consent for publication:

All participants were requested authorization to publish the results. In case of depression/anxiety, a visit to a mental health specialist was suggested.

5. A copy of the report was delivered to every diabetes strategy.

All methods employed were carried out in accordance with current guidelines and regulations.

6. Availability of data and materials:

not aplicable

7. Authors' contributions

FLJ: Elaborated the protocol, analized the information and wrote the article

LAC: Elaborated the protocol, reviewed the last version and approved the final version

BLE: Elaborated the protocol, reviewed the last version and approved the final version

DBP: Elaborated the protocol, and reviewed the last version and approved the final version

JFG: Elaborated the protocol, reviewed the last version and approved the final version

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Tables

Due to technical limitations, tables are only available as a download in the Supplemental Files section.

Figures

Figure 1

Patient uptake flow chart

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Tables.docx](#)