

Contouring A User Centered *ChatBot* For Diabetes Mellitus



Harnishya Palanichamy

The International School, Bangalore

pharnishya@tisb.ac.in

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Introduction

Diabetes Mellitus (DM) is a chronic health condition that affects how the body turns food into energy. It occurs when the body either doesn't produce enough insulin or can't use insulin effectively. Its management requires continuous adherence to medical care, self-management and monitoring, to mitigate the risks.

A Chatbot for Diabetes Mellitus, DBOT, was designed using a set of questions grouped under the components- Diabetes History, Medical History, Family History, Medical History (for women only), Eating/Exercising Habits, Tracking Health Status (Lab Test Results), Medicine Consuming Status, Knowledge about reducing the Risk, Frequently Asked Questions (FAQ), and DBOT Usage.

To design the DBOT, JAVA Coding, xml designing language and Android Studio tools were used. The flow charts and Coding sheets for the components were devised. The DBOT was shared with the diabetic patients for their utilisation and through a questionnaire survey the feedback from the respondents about user experience were collected.

The questionnaire data was analysed using statistical techniques like Independent Sample "t" test, Chi square, One-Way ANOVA, Correlation, and Factor Analysis for the comparison, relation and association between the components of DBOT.

The future step is to incorporate the recommendations and suggestions of users and restructure the DBOT with enhanced effectiveness.

Keywords

Systems Software; Mobile Apps; Diabetes Mellitus; DBOT; Questionnaire; Statistical techniques.

Background

Diabetes Mellitus

Diabetes Mellitus (DM) is a chronic disease associated with greater rates of cardiovascular illness, kidney disease, vision problems, and non-traumatic amputations. DM cannot be cured, but it can be detected, managed, and its prevention through continuous lifestyle monitoring can delay the further development of the disease. DM management is long, costly, and requires continuous adherence to medical care and in addition, it requires ongoing self-management and monitoring to mitigate the risks.

Medical Chatbot

A technology that fosters interaction between man and machine utilising dialog flow. Chatbots are programmed to understand medical language, respond to user queries, provide medical test results and even connect users with healthcare professionals. Medical chatbots aim to enhance patient engagement, streamline healthcare services, improve communication, and provide personalised care to individuals seeking medical assistance.

Statistical Tools

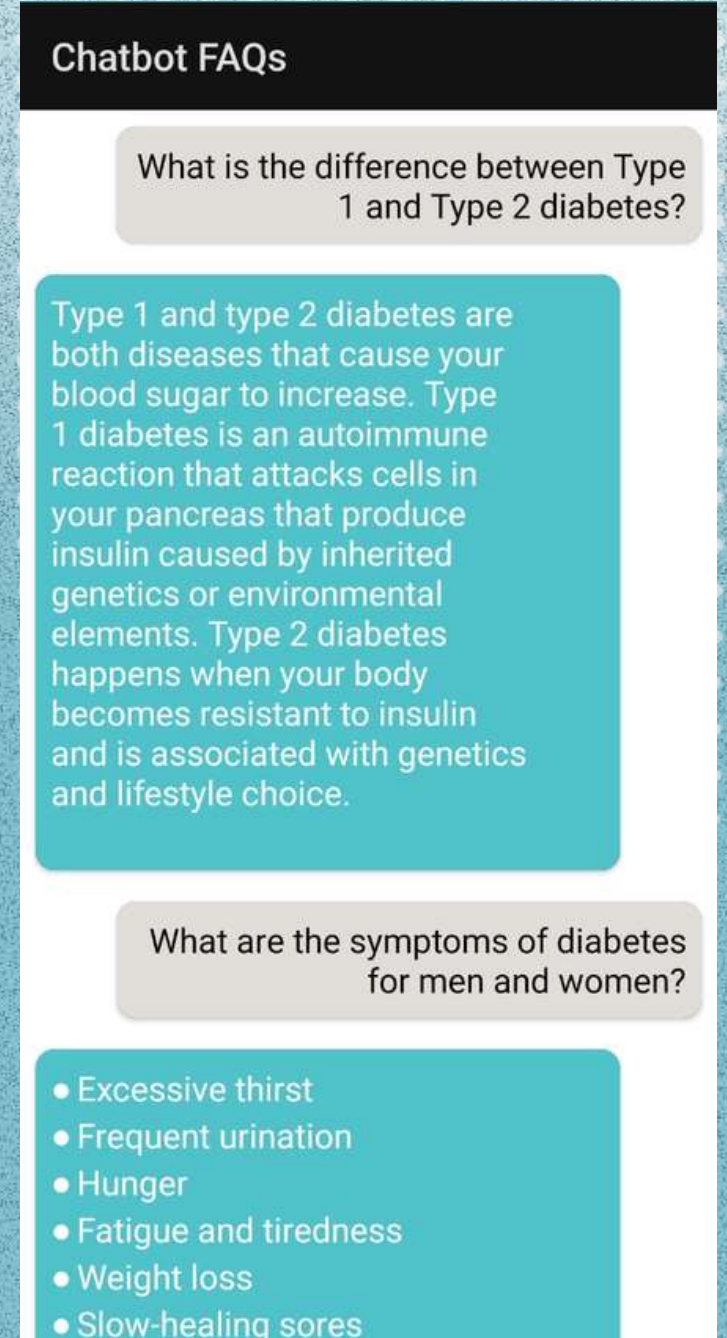
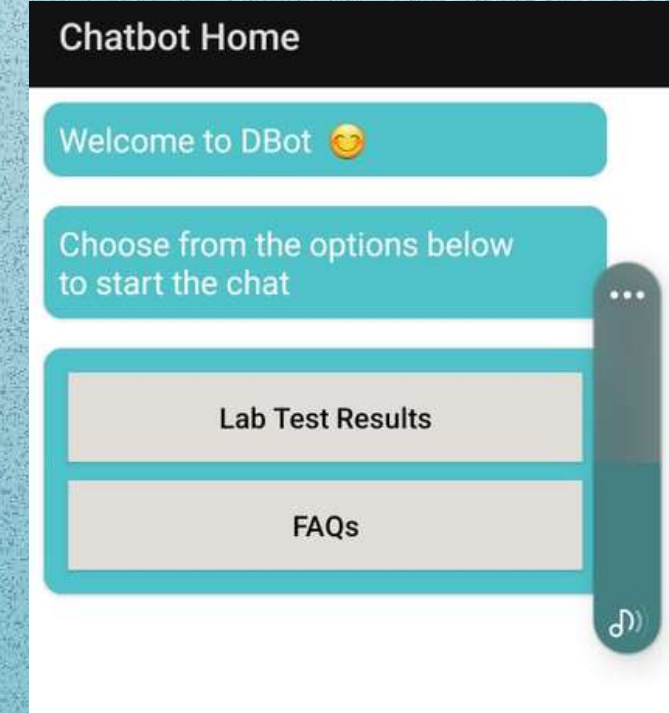
SPSS 16.0 is a comprehensive system for analysing data. Within this system, various tests were used to compare data, find correlations between data and associate different groups of data.

- 't' test - is a statistical method used to compare the means of two groups
- Chi - square test - is a statistical hypothesis test used to analyze contingency tables and determine if there is a relationship between two categorical variables.
- One - Way ANOVA Test - is a statistical method used to compare the means of three or more groups when there is one independent variable and one dependent variable
- KMO Test - is a statistical measure used in factor analysis to assess the sampling adequacy of the data. It evaluates whether the data is suitable for factor analysis by measuring the correlation between variables
- Bartlett test - is a statistical test used to assess the homogeneity of variances across multiple groups or samples



Background - DBOT

DBOT the chatbot was programmed by the JAVA programming language in Android Studio, with an aim to assist diabetic patients during the COVID pandemic, when restrictions were put in place to visit hospitals. The two main components in DBOT are the 'Lab Test Results' page and the 'FAQs' page. During the pandemic diabetic patients were not able to go out to lab test centres to get their diabetic test results (blood sugar levels, blood pressure levels and HbA1c levels) checked, something that is extremely crucial. However, most patients have simple equipment at home that measure these levels for them. When lab test results were sent to DBOT, DBOT was able to respond to them by stating whether their test result was low, normal or high and what to do in each situation. Apart from this, it also answered FAQs.



Objectives

The primary objectives of this project are as follows:

- ✓ To design a medical chatbot for diabetic patients
- ✓ To conduct a questionnaire survey for 10 components. (listed below)
- ✓ To assess the correlation within the components itself using statistical tools and the correlation between individual components and the DBOT user experience.

Data & Tools

Questionnaire Survey

Components

- Diabetes History
- Medical History
- Family History of Diabetes
- Medical History (for women only)
- Eating/Exercise habits
- Lab Test Results
- Prescription Status
- Knowledge about reducing the risks of Diabetes
- FAQs
- DBOT usage

Statistical Tools

- Two sample 't' test
- Chi- square test
- One way ANOVA test
- KMO test
- Bartlett Test

Methodology

1

Designing a flowchart of the various components of the app

- a. The various question and answer sequences the app will answer

2

Design a structure of the app on Figma implementing buttons and the navigation pathway for the different buttons and pages.

3

Using this Figma design to build the app using the programming language JAVA in Android Studio.

4

Selecting 100 patients from my father's clinic who have been using the app using random sampling and conducting a questionnaire survey.

It was ensured that a consent form was received from these patients and that their data was protected and not disclosed to any external parties.

5

The data received from this questionnaire was analyzed using various statistical tests for correlation between the 10 components.

And to deduce whether these 10 components played a role in the how a user interacted with the DBOT.

Research Question

How to design a user friendly medical chatbot?

Research Hypothesis

There is a significant difference between gender, age, locality and educational qualification of the respondent and the user experience of DBOT

Null Hypothesis

There is no significant difference between gender, age, locality and educational qualification of the respondent and the user experience of DBOT

Independent Variables

Gender, age, locality, educational qualification

Dependent Variables

Diabetes History, Medical History, Family History, Medical History (for women only), Eating/Exercising Habits, Tracking Health Status (Lab Test Results), Medicine Consuming Status, Knowledge about reducing the Risk, Frequently Asked Questions (FAQ), and DBOT Usage

Questionnaire

Questionnaire for DBOT User's Feedback

Personal Profile

- Name: _____
- Sex: Male Female
- Address: _____
- Where do you live: City/Town Village
- Contact Number: _____
- Age: 15-35 36-55 56 and above
- Marital status: Single Married
- Does anyone else who lives with you have diabetes? No Yes. If "yes," who: _____
- Do you have Supporting person/ Care taker? Yes No. If "yes," who: _____
- Occupation: Self employed Salaried Not working Work hours: <8 > 8
- Educational Qualification: _____

DBOT Components- The components used in framing DBOT are listed below. Share your opinion.

1. Diabetes History

- How long have you had diabetes or year diagnosed? _____
- How was it diagnosed? Accidentally Incidentally
- What symptoms you had during diagnosis? _____
- What type of diabetes do you have? Type 1 Type 2 Gestational Don't know
- Eye problems: Advanced Moderate No symptoms
- Heart problems: Advanced Moderate No symptoms
- Brain/Nerve problems: Advanced Moderate No symptoms
- Teeth/gums problems: Advanced Moderate No symptoms
- Feet/leg problems: Advanced Moderate No symptoms
- Skin problems: Advanced Moderate No symptoms
- Bone/Joint problems: Advanced Moderate No symptoms
- Gastro intestinal problems: Advanced Moderate No symptoms
- Kidney problems: Advanced Moderate No symptoms
- Frequent infections: Advanced Moderate No symptoms
- Other problems: Advanced Moderate No symptoms
- Do you have any physical limitations that may affect your ability to perform your self-care?
 - Hearing problems Problems with the use of your hands
 - Vision loss Problems with the use of your feet

2. Medical History

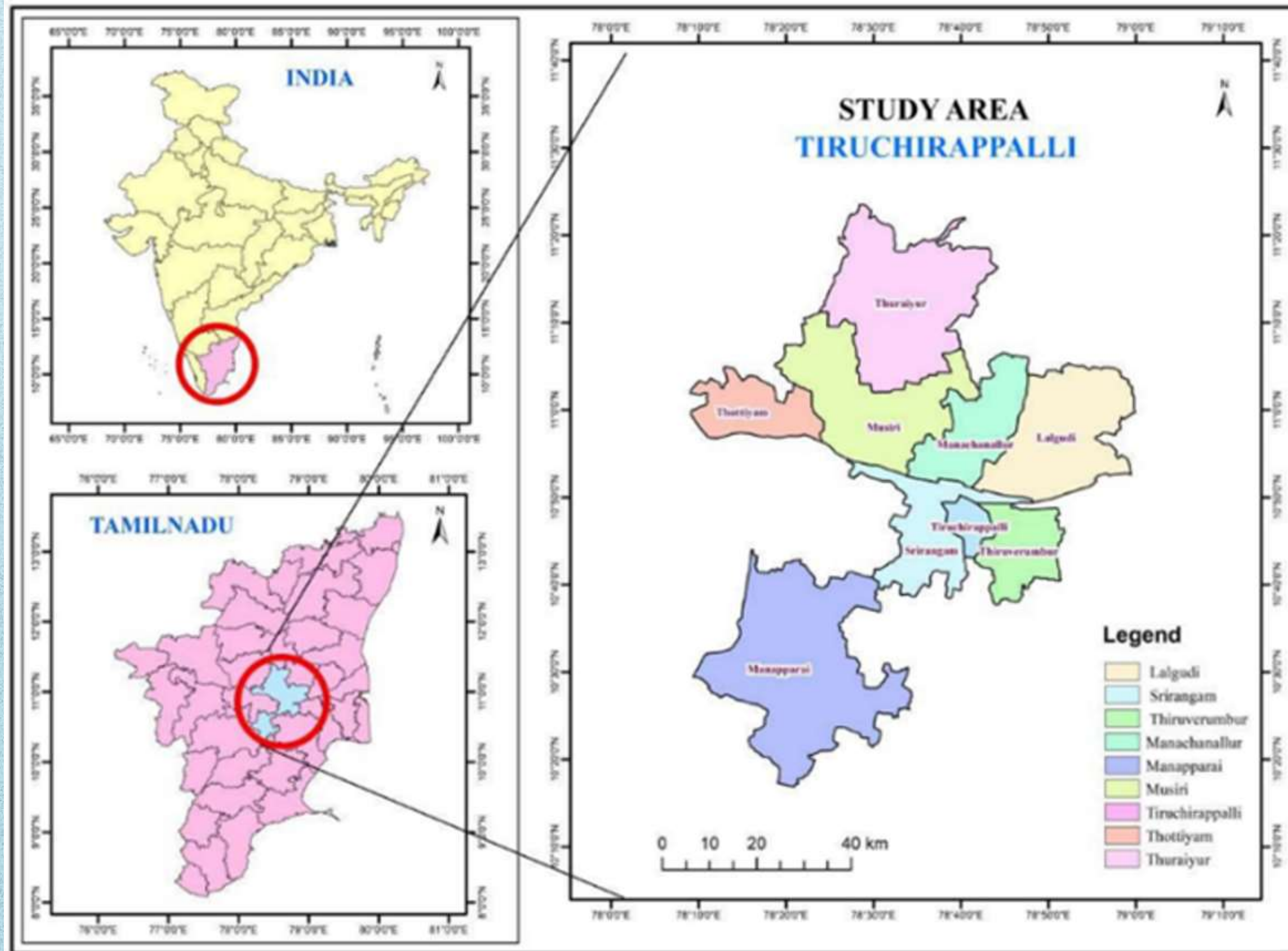
- Have you ever been diagnosed for the following ailments?
 - High Blood pressure High Cholesterol/Triglycerides Kidney/Bladder problems
 - Eye or vision problems Frequent nausea, vomiting, constipation, diarrhea
 - Surgery in the last 5 years Heart disease/Chest pain Thyroid disease
 - Asthma Numbness/pain/tingling of hands/feet Bone problems
 - Depression or anxiety Stroke Circulation problems
 - Obesity Shortness of Breath Skin problems
 - Other health problems: _____
- Do you have any allergies? Yes No. If "yes," Medicine Food
- Do you smoke? Yes No. If "yes" for how many years? _____
 Have you ever tried to quit? No Yes: How long ago? _____
 Would you like information on how to quit? _____
- Do you drink alcohol? Yes No. If "yes," for how many years? _____
 Have you ever tried to quit? No Yes: How long ago? _____
 Would you like information on how to quit? _____
- When was your last physical examination? _____
- How often do you see your regular doctor? _____
- Have you been hospitalized within the last 12 months? Yes No
 If "yes," describe reason(s) and where: _____

Did the above questions, framed in DBOT, under Component 2- Medical History, are conducive, beneficial and user friendly? Strongly agree Agree Disagree Strongly Disagree

3. Family History

- How many people live in your household? _____
- Who is diagnosed with diabetes First degree relatives Second degree relatives
- List any family members with diabetes: _____
 With Type 1: _____ With Type 2: _____
 With high blood pressure: _____ With heart attacks or other heart problems _____
 With stroke: _____ With cancer: _____
 Other complications _____ Other Diabetes related complications _____
 Oral drugs _____ Taking Insulin: _____

Did the above questions, framed in DBOT, under Component 3- Family History, are conducive, beneficial and user friendly? Strongly agree Agree Disagree Strongly Disagree



Comparison - DBOT user based on gender

Two Sample 't' Test

| Components | Male (N = 60) | | Female (N =40) | | Statistical Inference |
|--|---------------|---------|----------------|---------|--|
| | Mean | SD | Mean | SD | |
| Diabetes History | 15.83 | 3.698 | 14.91 | 3.407 | T=1.214, Df=98 .228 > 0.05 Not Significant |
| Medical History | 13.29 | 1.588 | 13.29 | 1.545 | T=0.020, Df=98 .984 > 0.05 Not Significant |
| Family History | 9.51 | 1.804 | 9.34 | 2.057 | T=-0.415, Df=98 .679 > 0.05 Not Significant |
| Medical History (For Women Only) | .00 | .000 | 14.57 | 1.195 | T=-1.722, Df=98 .369 < 0.05 Not Significant |
| Eating/ Exercising Habits | 9.12 | .801 | 9.34 | .802 | T=-1.308, Df=98 .194 > 0.05 Not Significant |
| Tracking Health Status (Lab Test Results) | 11.45 | 1.287 | 11.69 | 1.157 | T=-0.919, Df=98 .361 > 0.05 Not Significant |
| Medicine Consuming Status | 5.43 | .558 | 5.54 | .611 | T=-0.927, Df=98 .356 > 0.05 Not Significant |
| Knowledge about reducing the risk | 10.37 | 1.069 | 10.11 | .718 | T=1.264, Df=98 .209 > 0.05 Not Significant |
| Frequently Asked Questions | 12.05 | 3.054 | 11.97 | 3.082 | T=0.116, Df=98 .908 > 0.05 Not Significant |
| DBOT Usage | 11.06 | .768 | 11.14 | .430 | T=-0.579, Df=98 .564 > 0.05 Not Significant |
| All Components | 17.46 15 | 2.58044 | 16.5429 | 1.91500 | T=1.848, Df=98 .068 > 0.05 Not Significant |

Result-

The DBOT user experience's variance for Male and Female, does not show a significant difference

Comparison - DBOT user based on locality

Two Sample 't' Test

| Components | City/Town (N = 67) | | Village (N = 33) | | Statistical Inference |
|---|--------------------|---------|------------------|---------|---|
| | Mean | SD | Mean | SD | |
| Diabetes History | 15.28 | 3.609 | 15.97 | 3.618 | T=-0.693, Df=98 .374 > 0.05 Not Significant |
| Medical History | 13.43 | 1.406 | 13.00 | 1.837 | T=1.305, Df=98 .195 > 0.05 Not Significant |
| Family History | 9.37 | 1.976 | 9.61 | 1.713 | T=-0.576, Df=98 .564 > 0.05 Not Significant |
| Medical History (For Women Only) | 5.36 | 7.246 | 4.58 | 6.615 | T=0.522, Df=98 .603 < 0.05 Not Significant |
| Eating/ Exercising Habits | 9.24 | .676 | 9.12 | 1.023 | T=0.656, Df=98 .514 > 0.05 Not Significant |
| Tracking Health Status (Lab Test Results) | 11.61 | 1.114 | 11.36 | 1.475 | T=0.939, Df=98 .350 > 0.05 Not Significant |
| Prescription Status | 5.48 | .612 | 5.45 | .506 | T=0.187, Df=98 .852 > 0.05 Not Significant |
| Knowledge about reducing the risk | 10.28 | 1.012 | 10.27 | .876 | T=0.053, Df=98 .958 > 0.05 Not Significant |
| Frequently Asked Questions | 11.69 | 2.709 | 12.70 | 3.592 | T=-1.570, Df=98 .120 > 0.05 Not Significant |
| DBOT Usage | 11.13 | .672 | 11.00 | .661 | T=0.945, Df=98 .347 > 0.05 Not Significant |
| All Components | 17.1045 | 2.41921 | 17.2121 | 2.39475 | T=-0.210, Df=98 .834 > 0.05 Not Significant |

Result-

The DBOT user experience's variance with respondents living in City/Town and Village, does not show a significant difference.

Association - DBOT user based on age

Chi - square test

| Age of the Respondents | | | | | | | Statistical Inference |
|---|---|----------|---------|---------|----------|-------|---|
| Diabetes History | | | | | | | |
| | | Below 15 | 15 - 40 | 41 - 60 | Above 60 | Total | |
| Good | F | 10 | 29 | 29 | 2 | 70 | $\chi^2=81.905$ Df=3 .000 < 0.05 Significant |
| | % | 100.0% | 98.7% | 98.7% | 6.7% | 70.0% | |
| Bad | F | 0 | 1 | 1 | 28 | 30 | $\chi^2=11.392$ Df=3 .010 < 0.05 Significant |
| | % | .0% | 3.3% | 3.3% | 93.3% | 30.0% | |
| Medical History | | | | | | | $\chi^2=2.045$ Df=3 .563 > 0.05 Not Significant |
| Good | F | 0 | 2 | 8 | 11 | 21 | |
| | % | .0% | 6.7% | 26.7% | 36.7% | 21.0% | $\chi^2=1.099$ Df=3 .777 > 0.05 Not Significant |
| Bad | F | 10 | 28 | 22 | 19 | 79 | |
| | % | 100.0% | 93.3% | 73.3% | 63.3% | 79.0% | |
| Family History | | | | | | | $\chi^2=7.156$ Df=3 .067 > 0.05 Not Significant |
| Good | F | 5 | 21 | 20 | 17 | 63 | |
| | % | 50.0% | 70.0% | 66.7% | 56.7% | 63.0% | $\chi^2=44.920$ Df=3 .000 < 0.05 Not Significant |
| Bad | F | 5 | 9 | 10 | 13 | 37 | |
| | % | 50.0% | 30.0% | 33.3% | 43.3% | 37.0% | |
| Medical History (For Women Only) | | | | | | | $\chi^2=0.181$ Df=3 .981 > 0.05 Not Significant |
| Good | F | 5 | 20 | 20 | 20 | 65 | |
| | % | 50.0% | 66.7% | 66.7% | 66.7% | 65.0% | $\chi^2=0.962$ Df=3 .810 > 0.05 Not Significant |
| Bad | F | 5 | 10 | 10 | 10 | 35 | |
| | % | 50.0% | 33.3% | 33.3% | 33.3% | 35.0% | |
| Eating/ Exercising Habits | | | | | | | $\chi^2=6.543$ Df=3 .088 > 0.05 Not Significant |
| Good | F | 7 | 19 | 23 | 18 | 67 | |
| | % | 70.0% | 63.3% | 76.7% | 60.0% | 67.0% | $\chi^2=4.040$ Df=3 .257 > 0.05 Not Significant |
| Bad | F | 3 | 11 | 7 | 12 | 33 | |
| | % | 30.0% | 36.7% | 23.3% | 40.0% | 33.0% | |
| Tracking Health Status (Lab Test Results) | | | | | | | $\chi^2=6.543$ Df=3 .088 > 0.05 Not Significant |
| Good | F | 10 | 22 | 28 | 23 | 83 | |
| | % | 100.0% | 73.3% | 93.3% | 76.7% | 83.0% | $\chi^2=0.181$ Df=3 .981 > 0.05 Not Significant |
| Bad | F | 0 | 8 | 2 | 7 | 17 | |
| | % | .0% | 26.7% | 6.7% | 23.3% | 17.0% | |
| Prescription Status | | | | | | | $\chi^2=0.181$ Df=3 .981 > 0.05 Not Significant |
| Good | F | 0 | 8 | 20 | 29 | 57 | |
| | % | .0% | 26.7% | 66.7% | 96.7% | 57.0% | $\chi^2=0.181$ Df=3 .981 > 0.05 Not Significant |
| Bad | F | 10 | 22 | 10 | 1 | 43 | |
| | % | 100.0% | 73.3% | 33.3% | 3.3% | 43.0% | |
| Knowledge about reducing the risk | | | | | | | $\chi^2=0.181$ Df=3 .981 > 0.05 Not Significant |
| Good | F | 2 | 6 | 5 | 5 | 18 | |
| | % | 20.0% | 20.0% | 16.7% | 15.7% | 18.0% | $\chi^2=0.181$ Df=3 .981 > 0.05 Not Significant |
| Bad | F | 8 | 24 | 25 | 25 | 82 | |
| | % | 80.0% | 80.0% | 83.3% | 83.3% | 82.0% | |
| Frequently Asked Questions | | | | | | | $\chi^2=0.181$ Df=3 .981 > 0.05 Not Significant |
| Good | F | 7 | 20 | 17 | 18 | 62 | |
| | % | 70.0% | 66.7% | 56.7% | 60.0% | 62.0% | $\chi^2=0.181$ Df=3 .981 > 0.05 Not Significant |
| Bad | F | 3 | 10 | 13 | 12 | 38 | |
| | % | 30.0% | 33.3% | 43.3% | 40.0% | 38.0% | |
| DBOT Usage | | | | | | | $\chi^2=6.543$ Df=3 .088 > 0.05 Not Significant |
| Good | F | 10 | 24 | 23 | 21 | 78 | |
| | % | 100.0% | 80.0% | 76.7% | 70.0% | 78.0% | $\chi^2=6.543$ Df=3 .088 > 0.05 Not Significant |
| Bad | F | 0 | 6 | 7 | 9 | 22 | |
| | % | .0% | 20.0% | 23.3% | 30.0% | 22.0% | |
| All Components | | | | | | | $\chi^2=6.543$ Df=3 .088 > 0.05 Not Significant |
| Good | F | 9 | 20 | 18 | 14 | 61 | |
| | % | 90.0% | 66.7% | 60.0% | 46.7% | 61.0% | $\chi^2=6.543$ Df=3 .088 > 0.05 Not Significant |
| Bad | F | 1 | 10 | 12 | 18 | 39 | |
| | % | 10.0% | 33.3% | 40.0% | 53.3% | 39.0% | |

Results-

The DBOT user experience's variance with respondents of age groups- <15, 16-40, 41-60, and above 60 years, does not show a significant difference.

Comparison - DBOT user based on all ten components

One - way ANOVA test

| All Components | Diabetes History | Medical History | Family History | Medical History (For Women Only) | Eating/ Exercising Habits | Tracking Health Status (Lab Test Results) | Prescription Status | Knowledge about reducing the risk | Frequently Asked Questions | DBOT Usage |
|---|------------------|-----------------|----------------|----------------------------------|---------------------------|---|---------------------|-----------------------------------|----------------------------|------------|
| Diabetes History | 1 | .054 | -.018 | -.126 | -.175 | .117 | -.495** | .037 | .073 | .123 |
| | | .005 | .008 | .021 | .002 | .024 | .000 | .015 | .046 | .022 |
| | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Medical History | .054 | 1 | .010 | .009 | -.063 | -.002 | -.018 | -.054 | -.035 | .110 |
| | .005 | | .021 | .027 | .036 | .05 | .007 | .05 | .029 | .027 |
| | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Family History | -.018 | .010 | 1 | -.037 | -.093 | -.129 | .045 | .019 | -.049 | -.121 |
| | .008 | .021 | | .015 | .035 | .020 | .05 | .05 | .028 | .032 |
| | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Medical History (For Women Only) | -.126 | .009 | -.037 | 1 | .131 | .092 | .121 | -.112 | -.036 | .061 |
| | .021 | .027 | .015 | | .019 | .036 | .032 | .026 | .019 | .050 |
| | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Eating/ Exercising Habits | -.175 | -.063 | -.093 | .131 | 1 | -.148 | .100 | .187 | -.105 | -.128 |
| | .002 | .036 | .035 | .019 | | .014 | .021 | .002 | .030 | .020 |
| | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Tracking Health Status (Lab Test Results) | .117 | -.002 | -.129 | .092 | -.148 | 1 | -.027 | -.226* | .112 | .185 |
| | .024 | .05 | .020 | .036 | .014 | | .000 | .024 | .026 | .045 |
| | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Prescription Status | -.495** | -.018 | .045 | .121 | .100 | -.027 | 1 | -.003 | -.086 | .099 |
| | .000 | .007 | .05 | .032 | .021 | .000 | | .007 | .039 | .028 |
| | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Knowledge about reducing the risk | .037 | -.054 | .019 | -.112 | .187 | -.226* | -.003 | 1 | .063 | .023 |
| | .015 | .05 | .05 | .026 | .002 | .024 | .007 | | .031 | .019 |
| | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Frequently Asked Questions | .073 | -.035 | -.049 | -.036 | -.105 | .112 | -.086 | .063 | 1 | .158 |
| | .046 | .029 | .028 | .019 | .030 | .026 | .039 | .031 | | .017 |
| | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| DBOT Usage | .123 | .110 | -.121 | .061 | -.128 | .185 | .099 | .023 | .158 | 1 |
| | .022 | .027 | .032 | .050 | .020 | .045 | .028 | .019 | .017 | |
| | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

Factor Analysis - DBOT user based on all components

KMO and Bartlett's Test

| | | |
|---|--------------------|--------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy | | .767 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 84.412 |
| | Df | 36 |
| | Significance | .000 |

Result-

A KMO value over 0.5 and a significance level for the Bartlett's test below 0.05 suggest there is substantial correlation in the data.

The KMO value is 0.767, (which is very high), shows that the factor analysis is beneficial to test the components.

Result-

There exists a strong relationship between all the components among each other.

Total Variance

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
|-----------|---------------------|--------------|--------------|-------------------------------------|--------------|--------------|-----------------------------------|--------------|--------------|
| | Total | %of Variance | Cumulative % | Total | %of Variance | Cumulative % | Total | %of Variance | Cumulative % |
| 1 | 1.784 | 19.818 | 19.818 | 1.784 | 19.818 | 19.818 | 1.758 | 19.531 | 19.531 |
| 2 | 1.250 | 13.892 | 33.709 | 1.250 | 13.892 | 33.709 | 1.211 | 13.456 | 32.987 |
| 3 | 1.177 | 13.074 | 46.783 | 1.177 | 13.074 | 46.783 | 1.184 | 13.158 | 46.145 |
| 4 | 1.098 | 12.197 | 58.980 | 1.098 | 12.197 | 58.980 | 1.104 | 12.270 | 58.414 |
| 5 | 1.067 | 12.022 | 62.520 | 1.047 | 11.631 | 70.612 | 1.098 | 12.197 | 70.612 |
| 6 | 1.047 | 11.631 | 70.612 | | | | | | |
| 7 | .957 | 10.637 | 81.249 | | | | | | |
| 8 | .761 | 8.459 | 89.708 | | | | | | |
| 9 | .628 | 6.974 | 96.682 | | | | | | |
| 10 | .299 | 3.318 | 100.00 | | | | | | |

Result- Each component is grouped under 5 factors, according to their flexibility of usage. The first factor has 19.531 percentage of variance, the second, third fourth and fifth factor shows 13.456, 13.158, 2.270,12.197 respectively.

Rotated Component Matrix

| Components | Values | Component |
|---|--------|-----------|
| Diabetes History | .882 | 1 |
| Medical History | .889 | 1 |
| Family History | .642 | 5 |
| Medical History (For Women Only) | .779 | 2 |
| Eating/ Exercising Habits | .785 | 5 |
| Tracking Health Status (Lab Test Results) | .767 | 2 |
| Prescription Status | .902 | 4 |
| Knowledge about Reducing the Risk | -.656 | 3 |
| Frequently Asked Questions | .797 | 3 |
| DBOT Usage | .889 | 1 |

Result- Values close to '1' for each component shows that all the components are closely related to each other - they all some what of a correlation with one another either positive or negative.

Suggestions from respondents of the survey

- Chatbot Content to be displayed in Local language (Tamil- Official language of Tamil Nadu)
- Add a Diet Chart
- Reducing the number of questions under each component
- Increasing the number of questions under each component
- Simplify the FAQ, as some answers are found hard to understand.
- Avoid personal questions
- Recommend Test Centers
- Add Case studies for diabetic complications
- DBOT is extensive and long-drawn
- Encompass Voice Chat Assistance
- Include the Availability of the physician
- Comprehend illustrations and demonstrations for Diabetic Foot Ulcer

Conclusion

The feedback received from the questionnaire acts as guidelines on how to structure the DBOT more effectively in the future. DBOT is a tool supporting the diabetic patients and ensures it will not substitute the professional medical advice that a physician gives in person. This DBOT will provide diabetic patients with clinically validated particulars about Diabetes and all that the patients have to do is to commence chatting with DBOT through a few button clicks. It also connects the user to the doctor if necessary. From the questionnaire data that was analysed, it can be concluded that DBOT is designed in such a way that it is easy to use for regardless of gender, literacy age, or locality. A user interface that is intuitive and straightforward, ensuring that individuals of all backgrounds can navigate the app with ease has been implemented in DBOT. By incorporating clear and simple language, visual cues, and easy-to-understand instructions, it has been made sure that literacy levels do not pose a barrier to using DBOT. Additionally, the design takes into account diverse age groups, with features that are accessible and appealing to users of all ages.

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