# To Determine the Usefulness of ADA Risk Score to Predict T2dm/Pre Diabetes in South Indian Rural Population

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**ABSTRACT**

**Introduction:** Diabetes mellitus – so called "epidemic disease of the century" has become a serious public health issue. Our study was aimed to determine the effectiveness of ADA risk scoring in the south Indian rural population in predicting pre diabetic and diabetic among the study population.

**Material and methods:** This was an observational study to determine the the effectiveness of ADA risk scoring in south Indian rural population in predicting pre diabetic and diabetic among study population. In the present study of selected subjects were assessed for ADA scoring and HbA1c was done.

**Results:** In the present study, the mean HbA1C of patient with score less than 5 was $4.7 \pm 0.1$, mean HbA1C of patient with score more than or equal to 5 was $6.07 \pm 0.02$.which was significant with a *P* value of <0.01.

**Conclusion:** In our study we conclude that ADA risk scoring is a good indicator for identifying pre diabetes and type 2 diabetes mellitus in our population.

**Keywords:** ADA Score, Pre Diabetes, Type 2 Diabetes Mellitus.

## INTRODUCTION

We are in an era where communicable diseases have given way and non communicable diseases have taken the lead. Diabetes mellitus – so called "epidemic disease of the century"[1], has become a serious public health issue. The so called coca-colonization or industrialization of the civilization has a negative impact on diet and lifestyle, and as a result, the incidence of type 2 diabetes mellitus has reached a significant height. Due to increase in the incidence and its complications type 2 diabetes mellitus has gained importance because of its economic burden.

Though we have so much of media and other impact to prove the awareness of the disease still a significant number of subjects are being diagnosed late and after the development of the complications, the diagnosed subjects do not take proper care of the same. The disease still resembles the tip of the ice berg only in diagnosed and undiagnosed subjects of type 2 diabetes mellitus merged inside. This is mainly due to the unawareness of the rural population and the financial burden implicated on the testing modality, so it's important to have risk assessment or scoring to identify people with high risk and those prone to develop type 2 diabetes mellitus. As risk scoring may be different for different population and different race. Our study aimed to determine the effectiveness of ADA risk scoring in south Indian rural population in predicting pre diabetic and diabetic among study population.

## MATERIAL AND METHODS

This was an observational study to determine the the effectiveness of ADA risk scoring in south Indian rural population in predicting pre diabetic and diabetic among study population. The study is done in Sri Venkateshwaraa medical college hospital which is 750 bedded multidisciplinary centre serving the rural population in south India. 100 subjects were randomly selected among the patients admitted and attending outpatient department in general medicine who are not a known case of type 2 diabetic or pre diabetic.

**Sample collection:** After written consent for enrollment in the study, a detailed history was taken from all the subjects along with a detailed clinical examination, ADA risk score (Annexure 1) and HbA1c was done to the subjects.

**Inclusion criteria:** All subjects who are admitted or attending medicine OPD who are not a known case of type 2 diabetes or pre diabetic with age ≥18 years were included.

**Exclusion criteria:** Subjects who were on treatment for diabetes and on OHA for other conditions, pregnancy and subjects on steroid therapy were excluded from the study. The collected data was compiled and analyzed descriptively.

## RESULTS

In the present study the maximum number of subjects involved was between 20-40yrs (57%) which are active the age group who reflect the future (table 1).

In the present study the big difference of the shift was 62% of the subjects are females (table 2).

In the present study the subjects dominated the BMI of 20.1-25.0 with 52%. The next dominated BMI was 25.1-30 with 25% (table 3).

In the present study the scoring pattern was with 91% with a score of less than 5, only 9% with score of more than 5 (table 4).

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**ADA RISK SCORE**



## Are you at risk for type 2 diabetes?

**American Diabetes Association**

| Age | No of Patients | % of patients |
|---|---|---|
| 20-30 | 32 | 32% |
| 31-40 | 25 | 25% |
| 41-50 | 17 | 17% |
| 51-60 | 15 | 15% |
| >60 | 11 | 11% |
| Total | 100 | 100% |
| **Table-1:** Age wise Distribution | | |

| Sex | No of patients | % of patients |
|---|---|---|
| Male | 38 | 38% |
| Female | 62 | 62% |
| Total | 100 | 100% |
| **Table-2:** Sex wise distribution | | |

In the present study the mean HbA1C of patient with score less than 5 was $4.7 \pm 0.1$, mean HbA1C of patient with score more than or equal to 5 was $6.07 \pm 0.02$. Which was significant with a $P$ value of $<0.01$ (table 5).

In the present study the subjects with an HbA1C of $>6.5$ the ADA score was $7.0 \pm 0.001$ and subjects with an HbA1C of 5.7-6.5 the ADA score was $4.1 \pm 0.1$ (table 6).

## DISCUSSION

Diabetes is a disease in which your blood glucose or blood sugar levels are too high. Glucose comes from the foods

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| Range | Male | Female | No of patients |
|---|---|---|---|
| <15.0 | - | - | - |
| 15.1-20.0 | 06 | 12 | 18 |
| 20.1-25.0 | 26 | 26 | 52 |
| 25.1-30.0 | 03 | 22 | 25 |
| 30.1-35.0 | 02 | 02 | 04 |
| >35.0 | 01 | - | 01 |
| Total | 38 | 62 | 100 |
| **Table-3:** Body Mass Index distributions | | | |

| ADA scoring | No of patients | % of patients |
|---|---|---|
| <5 | 91 | 91% |
| ≥5 | 09 | 09% |
| Total | 100 | 100% |
| **Table-4:** ADA risk scoring | | |

| S.No | ADA score | HbA1C | *P* value |
|---|---|---|---|
| 1 | ≥5 | 6.07 ± 0.02 | $P < 0.01$ |
| 2 | <5 | 4.7 ± 0.1 | |
| **Table-5:** ADA scoring vs. HbA1C | | | |

| HbA1C | ADA score | *P* value |
|---|---|---|
| <5.7 | 89 (1.78 ± 0.02) | $P < 0.001$ |
| 5.7-6.5 | 10 (4.1 ± 0.1) | |
| >6.5 | 01 (7.0 ± 0.001) | |
| **Table-6:** HbA1C vs. ADA risk scoring | | |

we eat. Insulin is a hormone that helps the glucose gets into the cells to give them energy. Pre diabetes is a serious health condition where blood sugar levels are higher than normal, but not high enough yet to be diagnosed as type 2 diabetes. In this study, we have showed that the suggested recommendations by ADA were effective in screening for undiagnosed cases of diabetes in our population. The ADA diabetes risk test has higher specificity, positive predictive value and positive likelihood ratio, but lower NNT comparing to the screening criteria with similar sensitivity, NPV and NDRL. The risk test appears to be attractive as a non-invasive means to be used in the Chinese population as this approach has high NPV, which is important as diabetes can be ruled out with high confidence, and the NNT is low. The ADA and CDC scores performed well for DM as well as pre DM in independent data, recent NHANES, and we view this as external, temporal validation. The ADA score performed somewhat but nearly uniformly better, and we believe this is partly due to multiple categories used for age and obesity which show strong monotonicity in disease prevalence.[2] The definition of diabetes used in development of the ADA diabetes risk test was based on fasting plasma glucose value. In this CRISPS cohort, subjects were also considered to have diabetes if they fulfilled either the fasting glucose or 2-hour Glucose criteria. We did not use HbA1c as a diagnostic criterion for diabetes because the diagnostic criteria have changed over time with HbA1c being adopted from 2011 onwards.[3] The HbA1c criterion would have diagnosed an additional number of subjects with diabetes on

top of the glucose criteria at CRISPS3 which might affect the number of people without diabetes at CRISPS4, i.e. the study time frame of this study.[4] Recent studies have shown that type 2 diabetes can be prevented in high-risk subjects with impaired glucose tolerance by lifestyle intervention.[5-7] Therefore, a strong argument exists in favor of screening for subjects who are at increased risk for diabetes.[8] Studies done to screen and identify pre diabetes and diabetes are not new to this century it's started to have different questionnaire and scoring system to suit all type population. A few reports[9-14] have suggested different questionnaire and scoring of screening for predicting diabetes in undiagnosed diabetes, in these assessments, the outcome was fitting to provide a good predictive valve to diagnosis diabetes in undiagnosed diabetes in a cross-sectional setting. In a follow-up study[15] with a median follow-up of 8 years, BMI at baseline predicted diabetes as well as fasting; in that study, no other risk factors for diabetes were analyzed. In a recent follow-up study, Stern et al.[16] developed two models to predict diabetes incidence: a clinical model including age, sex, ethnicity, fasting glucose, systolic blood pressure, HDL cholesterol, BMI, and family history of diabetes; and a full model that also included 2-h glucose, diastolic blood pressure, total and LDL cholesterol, and triglyceride. Therefore, they included in their models most of the parameters of the metabolic syndrome as defined by the WHO Consultation.[17] But comparing all the above study design our study which was done to estimate the predictive value of ADA risk score to predict pre diabetes and diabetes was effective in its sensitivity and specificity. It's important that in a large scale with different set of population with different diet pattern this study will provide greater results.

## CONCLUSION

In our study we conclude that ADA risk scoring is a good indicator for identifying pre diabetes and type 2 diabetes mellitus in our population. ADA risk scoring can be used in the Indian population in a community level at different setup to identify the risk candidates for pre diabetic and type 2 diabetes mellitus. The advantage over the ADA scoring is cost effective and non invasive process to identify; only the risk stratified subjects can be investigated further.

## ABBREVATIONS

NPV      - Negative Predictive Value;
NDLR    - Negative Diagnostic Likelihood Ratio;
NNT      - number needed to test for blood glucose levels to diagnose one case of diabetes

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