



Contents lists available at BioMedSciDirect Publications

## International Journal of Biological & Medical Research

Journal homepage: [www.biomedscidirect.com](http://www.biomedscidirect.com)



### Original Article

# Diabetes and Hypertension in the age group of 18- 40 years in south Indian population and its relation to Indian diabetes risk scores (IDRS) and Anthropometric measures.

Avinash P Tekade<sup>a\*</sup>, Venkata Venu Gopala Raju Srijampana<sup>b</sup>.

<sup>a\*</sup> Associate Professor, Dept of Physiology, Katuri medical college, Guntur, A.P

<sup>b</sup> Associate Professor, Dept of Physiology, Katuri medical college, Guntur, A.P

#### ARTICLE INFO

##### Keywords:

Indian diabetes risk scores (IDRS)  
Fasting plasma glucose

#### ABSTRACT

**Objective:** To find out the percentage of diabetics and impaired glucose tolerance in the young adults of south India. And to know the risk of Developing Diabetes among the same group by using IDRS.

**Methods:-**

Fasting plasma glucose, by semi Auto analyzer.

Estimation of Blood pressure, by mercury sphygmomanometer.

Waist circumference (W.C.), by flexible non-stretchable measuring tape.

Indian diabetes risk scores (IDRS)

Body mass index (B.M.I.)

**Results:** By IDRS 51.7% males and 47.24 females are in moderate risk of developing diabetes. And 26.3% males and 31.03% females are in very high risk of developing diabetes, risk is increasing with the age. IDRS is more useful in Indians for prediction of obesity related diseases. Out of 613 participants, Diabetes was noted among the 13.6% participant (12.38% in males and 14.82 in females). And additionally impaired glucose tolerance is observed in 12.63% (11.14 in males and in females 14.13). A significantly higher WC and BMI were observed in Diabetics and Impaired Glucose tolerance compared to non-Diabetics.

© Copyright 2010 BioMedSciDirect Publications IJBMR -ISSN: 0976:6685. All rights reserved.

## 1. Introduction

Obesity is disease associated with extensive human suffering & also a massive financial cost to society. Obesity develops overtime and once it has done so, it leads to Diabetes, Hypertension etc.

India is currently in the grip of an explosive epidemic of type 2 diabetes. India already has more than 50 million people living with diabetes in India. It is even more worrying that more than 50% of individuals with diabetes remain unaware that they have this condition.

South Indian as their dietary habits is mostly rice rich and sedentary compared to the other Indians, so they are at high risk of developing abdominal obesity and which leads to developing

diabetes and subsequent related diseases.

As the Indian peoples carry more body fat as compared to western people (for similar age, height, weight) for the same values of BMI and WC. And Indians have proportionally less leg muscle mass compared to western.

## 2. Materials and Methods:

The methods adopted for the present study are:-

- Consent taking
- History taking
- General & systemic examination
- Study procedure
- Equipment used

Study subjects were selected from Guntur (AP) urban area in the age group of 18-40 years, Subjects were 613, males 323 & female 290. For the study subjects exclusion criteria and inclusion criteria applied.

\* Corresponding Author : Dr. Avinash P Tekade,  
Department of Physiology,  
Katuri medical college,  
Guntur. A.P. 522019  
India.  
Contact No:-09247106740  
E.mail: - [dravinashstekade@yahoo.co.in](mailto:dravinashstekade@yahoo.co.in)  
[dravinashstekade@gmail.com](mailto:dravinashstekade@gmail.com)

**Exclusion criteria**

Any chronic illness  
 Malignant or benign disorder  
 Renal disease  
 Respiratory disease  
 C.N.S. disorders  
 Endocrine disorders

**Inclusion criteria**

In the Age group of 18- 40 years  
 Resident of south India  
 Having specific dietary habits of south Indian family

All the participants were informed about the purpose of study nature, and informed consent have been obtained. Subjects are grouped into categories of BMI & WC in accordance with the WHO health cut-off. A general and systemic examination was carried out. This study is approved by Institutional Ethical committee.

Waist circumference was measured with an inelastic tape used at the narrowest part of the torso at the end of expiration in the standing position. Body weight was measured in the standing motionless position on the electronic weighing machine which has the error of 10 to 20 g. Height was recorded by a standiometer in bare footed standing position, head upright look straight ahead position.

The Diagnosis of diabetes mellitus and impaired glucose tolerance was based on WHO guidelines:-

**Diabetes mellitus:-**

A Fasting plasma glucose level 7 mmol/l (126mg/dl) after a minimum 12 hours fast  
 2 hour postprandial glucose level 11.1mmol/l (200mg/dl)

**Impaired glucose tolerance**

Fasting plasma glucose level of  $\geq 5.6$ mmol/l (100mg/dl) but  $<7.0$  mmol/l (126mg/dl)

Venous blood samples were taken after a 10 – 12 hour fast, and were examined in the biochemistry laboratory by using the semi-auto Analyzer; we have maintained the daily standard.

The Diagnosis of Hypertension was based on WHO guidelines:-

Systolic blood pressure 140mm Hg or more  
 Diastolic blood pressure 90 mmHg or more

For estimation of BP, an average of three readings measured thrice at an interval of 15 minutes was taken, with the participants in a sitting position, using a mercury sphygmomanometer.

The **Indian Diabetes Risk Scores (IDRS)** is a simple two minute scoring system which can be used to assess an individual's risk of having diabetes, is used in this study.

The IDRS utilizes 3 questions and simple measurement to calculate a score which represents the individual's risk of having diabetes.

The 3 questions are:-

How old are you?  
 Do either, or both your parents have diabetes?  
 How physically active are you at work and at home?

Indian Diabetes Risk Score	
Age (A)	Score
<35 years	0
35 to 50 years	20
>50 years	30
Waist circumference (pant size) (B)	
<80 cm (32") in females or <90 cm (36") in males	0
80-89 cm (32-35") in females or 90-99 cm (36-39") in males	20
$\geq 90$ cm (36") in females or $\geq 100$ cm (40") in males	30
Physical activity (C)	
Vigorous regular exercise or strenuous manual labour at home or work	0
mild to moderate regular exercise or moderate physical activity at home or work	20
No exercise; sedentary at home and work	30
Family history (D)	
No family history	0
Either parent diabetic	10
Both parents diabetic	20

The total of the four scores A+B+C+D gives the IDRS. If the IDRS is below 30, the risk of developing diabetes is probably low. If the IDRS is between 30 and 50, there is moderate risk of developing diabetes. If the IDRS is 60 or more, there is very high risk of developing diabetes.

**3. Results**

By IDRS 51.7% males and 47.24 females are in moderate risk of developing diabetes. And 26.3% males and 31.03% females are in very high risk of developing diabetes, risk is increasing with the age. IDRS is more useful in Indians for prediction of obesity related diseases.

Out of 613 participants, Diabetes was noted among the 13.6% participant (12.38% in males and 14.82 in females). And additionally impaired glucose tolerance is observed in 12.63% (11.14 in males and in females 14.13). A significantly higher WC and BMI were observed in Diabetics and Impaired Glucose tolerance compared to non-Diabetics.

**Table No. 1** Numbers of obese study subjects according to BMI (WHO)

Classification	Male		Total	
	Numbers	%	Numbers	%
Normal 18-24.9	224	69.34	178	61.37
Overweight 25-29.9	75	23.21	84	28.96
Obese 30-34.5	24	7.43	28	9.65
Total	323		290	613

**Table No.2** Numbers of obese male subjects according to WC (WHO)

Classification	Male	
	Numbers	%
Low risk ≤93 cm	186	57.58
Increased risk 94 - 101 cm	108	33.43
Substantial risk ≥102 cm	29	8.97
Total	323	

**Table No.3** Numbers of obese female subjects according to WC (WHO)

Classification	Male	
	Numbers	%
Low risk ≤79 cm	137	47.24
Increased risk 80 - 87 cm	112	38.62
Substantial risk ≥88 cm	41	14.13
Total	290	

**Table No.4.** Indian diabetes risk scores (IDRS) in study subjects

Age in years	Sex	IDRS <30	IDRS 30 to 50	IDRS ≥60
18-24	M-58	15 (25.86)	30 (51.72)	13 (22.41)
	F-72	16 (22.22)	34 (47.22)	22 (30.55)
25-30	M-76	20 (26.31)	41 (53.94)	15 (19.73)
	F-61	21 (34.42)	27 (44.26)	13 (21.31)
31-35	M-118	28 (23.72)	63 (53.38)	27 (22.88)
	F-95	19 (20)	54 (56.84)	22 (23.15)
36-40	M-71	8 (11.26)	33 (46.47)	30 (42.25)
	F-62	7 (11.29)	22 (35.48)	33 (53.22)
Total	M-323	71 (21.98)	167 (51.7)	85 (26.31)
	F-290	63 (21.72)	137 (47.24)	90 (31.03)

**Table No.5.** Distribution of Diabetics subjects

Age in years	Sex	Previously Diagnosed	Newly Diagnosed	Total Diabetic	IGT	Non-Diabetic
18-24	M-58	0	3 (5.17)	3 (5.17)	3 (5.17)	52 (89.65)
	F-72	1 (1.39)	4 (5.56)	5 (6.94)	7 ((9.72)	60 (8.34)
25-30	M-76	3 (3.96)	4 (5.26)	7 (9.21)	5 (6.58)	64 (84.21)
	F-61	2 (3.28)	4 (6.56)	6 (9.83)	7 (11.47)	48 (78.68)
31-35	M-118	6 (5.08)	10 (8.48)	16 (13.5)	12 (10.17)	90 (76.27)
	F-95	7 (7.37)	14 (14.74)	21 (22.1)	14 (14.73)	60 (63.15)
36-40	M-71	8 (11.27)	5 (7.04)	14 (19.71)	16 (22.53)	41 (57.74)
	F-62	5 (8.06)	6 (9.68)	11 (17.74)	13 (20.96)	48 (77.4)
Total	M-323	17 (5.26)	22 (6.81)	40 (12.38)	36 (11.14)	247 (76.47)
	F-290	15 (5.17)	28 (9.65)	43 (14.82)	41 (14.13)	206 (71.03)

\*M for male, F for female. In () % given

**Table No.6** Distribution of Hypertensive subjects

Age in years	Sex	Previously Diagnosed	Newly Diagnosed	Total Hyperten.	Non Hyperten
18-24	M-58	0	0	0	58
	F-72	0	0	0	72
25-30	M-76	0	0	0	76
	F-61	0	1 (1.63)	1 (1.63)	60 (98.36)
31-35	M-118	0	2 (1.81)	2 (1.81)	116 (98.3)
	F-95	1 (1.05)	2 (2.1)	3 (3.15)	92 (96.84)
36-40	M-71	2 (2.81)	5 (7.04)	7 (9.85)	64 (90.14)
	F-62	3 (4.83)	4 (6.45)	7 (11.29)	55 (88.7)
Total	M-323	2 (0.61)	7 (2.16)	9 (2.78)	314 (97.2)
	F-290	4 (1.37)	7 (2.41)	11 (3.79)	279 (96.2)

\*M for male, F for female. In () % given

**Table No.7** Frequency of Hypertension among the Diabetics

Age in years	Sex	Total Diabetic	Total Hyperten.	Hyp. Among Diabetics
18-24	M	3 (5.17)	0	-
	F	5 (6.94)	0	-
25-30	M	7 (9.21)	0	-
	F	6 (9.83)	1 (1.63)	1 (16.66)
31-35	M	16 (13.5)	2 (1.81)	2 (12.5)
	F	21 (22.1)	3 (3.15)	3 (14.28)
36-40	M	14 (19.71)	7 (9.85)	7 (50)
	F	11 (17.74)	7 (11.29)	6 (54.54)
Total	M	40 (12.38)	9 (2.78)	9 (22.5)
	F	43 (14.82)	11 (3.79)	10 (23.25)

\*M for male, F for female. In () % given

#### 4. Discussion

The prevention and management of obesity/overweightness should be considered a priority. And via health education awareness regarding diet and exercise importance should be conveyed to peoples. More emphasis on waist circumference reducing exercise should be given.

Because of high risk of south Indian peoples for the development of the abdominal obesity and related diseases, in this area awareness regarding obesity related diseases should be considered seriously. And effective primary prevention strategies have to be intensified among this high risk population. In particular National Diabetes control program should be implemented seriously.

#### Clinical Applications:-

IDRS should be included as part of physical clinical examinations.

The advantage of such an estimate are considerable and should allow a much more satisfactory interpretation and follow up of many clinical conditions

#### Future aspects:-

WC values should be stratified into 5 or 6 risk strata, much as BMI's are stratified in current WHO classification. Diabetes Risk score should be developed for particular area by considering the factors such as ethnicity, Race, cultural variations, Geographical variations.

**Acknowledgements:** - I would like to thanks all the volunteer subjects for their cooperation in this study

#### 5. References

- [1] Mohan V, Deepa R, Deepa M et al. a simplified Indian diabetes risk score for screening for undiagnosed diabetic subjects. *J Assoc Physicians India* 2005;53:759-763.
- [2] Comparison of Body Mass Index, Waist circumference, and Waist/Hip Ratio in Predicting Incident Diabetes: A Meta-Analysis *Epidemiologic reviews* Advance Access published may 10, 2007
- [3] BMI and W.C. independently contribute to the prediction of nonabdominal, abdominal subcutaneous and visceral fat. *Am J Clin Nutr* 2002; 75:683-8.
- [4] Dietary patterns and changes in body mass index and waist circumference in adults. *Am J Clin Nutr* 2003; 77:1417-25. Health risk". *Am. J. CLIN. NUTR.* 2004; 79, pages 379 – 384.

- [5] "Waist circumference not BMI explains obesity related Health risk". *Am. J. CLIN. NUTR.* 2004; 79, pages 379 – 384.
- [6] Waist circumference: a simple, inexpensive, and reliable tool that should be included as part of physical examination in the doctor's office *Am J Clin Nutr* 2003; 78:902-3.
- [7] Waist circumference and not body mass index explains obesity related health risk. *Am. J Clin Nutr* 2004;79:379-84
- [8] Waist circumference and abdominal adipose tissue distribution: influence of age and sex. *Am J Clin Nutr* 2005; 81:1330-4.
- [9] Public health foundation of India, Module 2 metabolic abnormalities in type 2 diabetes.
- [10] Principals of medicine, Harrison's 17th edition