

## Background

- The FINish Diabetes Risk Score (FINDRISC) questionnaire developed in 2001 helps in identifying the 10-year risk of developing diabetes and pre-diabetes in adults<sup>1</sup>.
- It consists of eight questions on risk factors such as age, BMI, waist circumference, family history of diabetes, levels of physical activity, diet, use of anti-hypertensive drugs and personal history of hyperglycaemia<sup>1</sup>.
- Recently, it has been shown that visceral fat mass has stronger associations with diabetes and pre-diabetes<sup>2</sup>. Although the gold standard for quantifying visceral fat (VF) is computed tomography (CT), Bioelectrical Impedance Analysis (BIA) can also be used to accurately measure visceral fat<sup>3</sup>.
- It is our hypothesis that the FINDRISC score has strong correlation with visceral fat along with its obesity parameters such as BMI and waist circumference.

## Aim

The objective of the study was to analyse the correlation between VF and FINDRISC in subjects with diabetic parents who were treated at a diabetes care centre and its contribution in prediction of pre-diabetes and diabetes.

## Methods and Materials

- The study is an ongoing analysis of 222 subjects (108 women and 114 men), over a one year period; whose parents (either one or both) had a history of diabetes.
- The FINDRISC score was determined in all patients. Visceral fat was measured using BIOELECTRICAL IMPEDANCE ANALYSIS.
- The subjects were then divided into two risk groups characterized by FINDRISC: low to slightly elevated risk group: <7-11 points; Moderate to High risk group: 12->14 points.
- Statistical analysis was done using SPSS 24 which included Students t test and Pearson correlation matrix to assess correlation between variables at  $p < 0.05$ .

## Results

- When subjects were categorized according to FINDRISC, those at higher risk (>12 points) had higher values for the components that add points to the score [age ( $p=0.010$ ), BMI ( $p<0.0001$ ), waist circumference ( $p<0.0001$ )] and other cardio metabolic risk factors [blood pressure ( $p<0.0001$ )] and visceral fat ( $p<0.0001$ )] (Table 1).
- In the Pearson correlation analysis, there was a statistically significant positive correlation between the FINDRISC and body mass index-BMI ( $r = 0.590$ ;  $p = <0.0001$ ), waist circumference ( $r = 0.585$ ;  $p = <0.0001$ ) and visceral fat ( $r = 0.567$ ;  $p = <0.0001$ ). We also observed a statistically significant negative correlation between the FINDRISC and height ( $r = -0.304$ ;  $p = <0.0001$ ) (Table 2).

**Table 1. Patients characteristics categorized to type 2 diabetes risks according to FINDRISC.**

Characteristics	Low-slightly elevated risk (<7 to 11 points) n = 111	Moderate to High risk (12 to >14 points) n = 111	Student t test (P value)
Female/Male	36 (32.4%)/ 75 (67.6%)	72 (64.8%)/ 39 (35.2%)	-
Age	32.5 ± 12.53	37.1 ± 13.86	0.010
Height (cm)	165.6 ± 10.23	161.61 ± 8.98	0.002
Weight (kg)	67.6 ± 10.91	78.04 ± 15.31	<0.0001
Systolic Blood Pressure (mmHg)	120.6 ± 15.85	126.40 ± 17.57	0.010
Diastolic Blood Pressure (mmHg)	76.2 ± 7.63	78.56 ± 9.22	0.040
Random Blood Sugar (mg/dL)	109.3 ± 33.14	117.15 ± 32.72	0.078
BMI (kg/m <sup>2</sup> )	24.6 ± 3.36	29.78 ± 4.92	<0.0001
Visceral Fat (%)	9.4 ± 4.32	15.25 ± 5.76	<0.0001
Total Fat (%)	29.8 ± 6.88	36.45 ± 5.52	<0.0001
Waist circumference (cm)	90.4 ± 8.83	102.14 ± 10.45	<0.0001
Hip circumference (cm)	101.9 ± 7.44	110.0 ± 9.44	<0.0001
Waist/Hip ratio	0.8 ± 0.08	1.76 ± 9.12	0.289
FINDRISC score	8.50 ± 2.15	13.9 ± 1.80	<0.0001

**Table 2: Correlation between FINDRISC and Height, BMI, waist circumference and visceral fat**

Characteristics	Low-slightly elevated risk (<7 to 11 points) n = 111		Moderate to High risk (12 to >14 points) n = 111		Total Score n = 222	
	Pearson Correlation	Sig. (2-tailed)	Pearson Correlation	Sig. (2-tailed)	Pearson Correlation	Sig. (2-tailed)
Height	-.215*	0.023	-.278**	0.003	-.304**	<0.0001
BMI	.353**	0.000	.332**	0.000	.590**	<0.0001
Visceral Fat	.355**	0.000	.310**	0.001	.567**	<0.0001
Waist circumference	.346**	0.000	.322**	0.001	.585**	<0.0001

Correlation is significant at the 0.05\* level (2-tailed) and 0.01\*\* level (2-tailed).

## Conclusion

- In subjects with diabetic parents, visceral fat is significantly associated with an increase in FINDRISC.
- Early detection of high risk population for pre-diabetes or T2DM using BIOELECTRICAL IMPEDANCE ANALYSIS for VF in combination with FINDRISC is a promising mode of preventive diabetes medicine.
- Since CT exposes subjects to radiation it is not suitable for periodical measurements. In contrast, BIA machines are relatively cheap and portable, subjects are not exposed to radiation and clinics can use them more freely<sup>4</sup>.
- Finally, timely lifestyle interventions along with counselling will empower high risk individuals for self-management.

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