

Relationship of an Adipokine Chemerin with Subclinical Diabetes

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Background

- Type 2 diabetes mellitus (T2DM) is a metabolic disorder characterized by raised blood glucose due to insulin resistance and a relative insulin deficiency
- Pakistan ranks 6th among countries with the largest burden of diabetes mellitus and is expected to have a diabetic population of 14.5 million by 2025 ⁽¹⁾
- White adipose tissue is a recognized long-term energy store in the body and has been found to be an endocrine organ secreting bioactive molecules, called adipokines ⁽²⁾
- Chemerin is a recently found adipokine, suspected to have a role in energy metabolism, inflammation and adipogenesis, and this renders chemerin to have a link between obesity and development of T2DM ⁽³⁾
- This study aims to identify whether chemerin in conjunction with TNF α and hsCRP can act as screening marker to identify subclinical diabetes

Methodology

52 asymptomatic healthy volunteers and 22 known diabetic (DM) subjects were enrolled

23 out of 52 healthy volunteers were classified as newly diagnosed diabetics (NDM), by oral glucose tolerance test (OGTT). Rest were classified as control (n=29)

Commercially available ELISA kits were used for measuring serum Chemerin, hsCRP and TNF α

BMI was calculated by Quetlet's index and body fat percentage was measured through bioelectrical impedance analysis (BIA)

Statistical analysis of the data was performed using the SPSS for Windows 19 software package (SPSS Inc., Chicago, IL)

Results

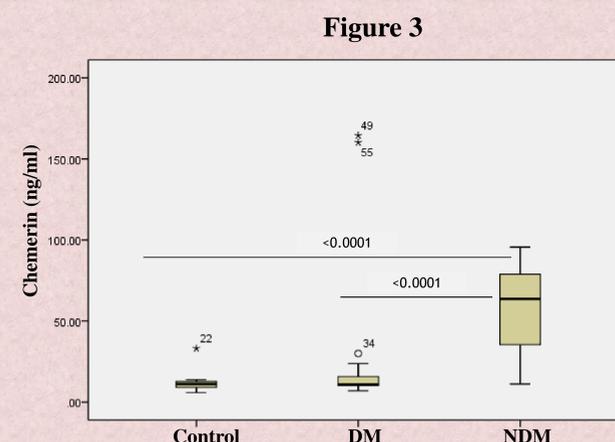
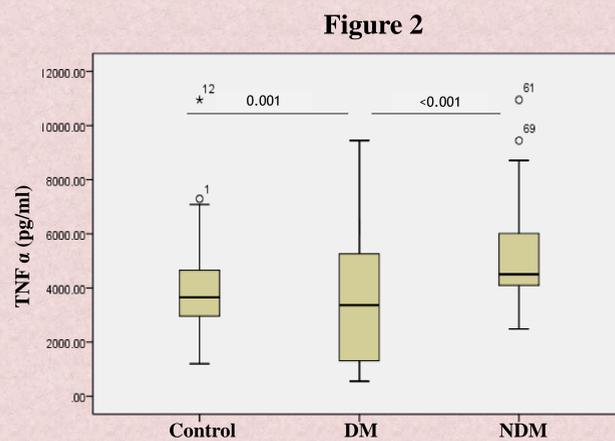
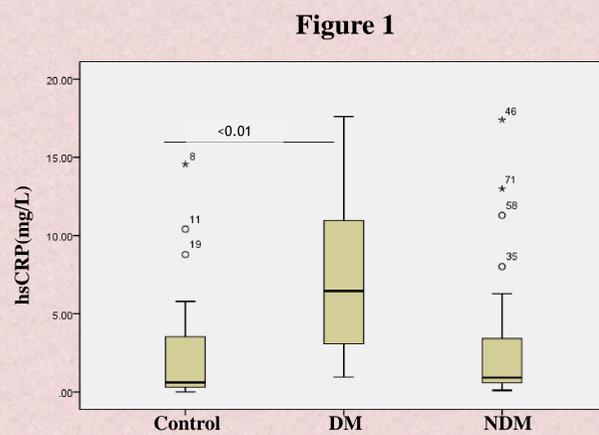
Table 1: Biophysical data of the study participants

	Control (n=29) Mean \pm SD	Known Diabetic (n=22) Mean \pm SD	Newly Diagnosed Diabetics (n=23) Mean \pm SD
Age (year)	29.93 \pm 9.77	52.18 \pm 6.41	42.57 \pm 8.40
Weight (kg)	62.52 \pm 10.08	67.09 \pm 8.91	85.12 \pm 20.84
BMI (kg/m ²)	22.40 \pm 3.15 ^{††}	25.73 \pm 3.44	30.64 \pm 6.81 ^{**}
Body Fat %	24.65 \pm 8.61	22.75 \pm 6.78 ^{^^}	32.84 \pm 5.81 ^{**}
FBS (mg/dl)	84.54 \pm 15.94 ^{††}	140.60 \pm 25.69	133.61 \pm 35.74 ^{**}

Mann Whitney U test was applied for significant difference between ^{**}Control vs. NDM (p<0.001), ^{^^}DM vs. NDM (p<0.001) and ^{††}Control vs. DM (p<0.001). Where: DM is Diabetes Mellitus Type 2, and NDM is newly diagnosed diabetics. p value <0.05 considered significant.

References:

- Wild et al. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. Diab Care 2004; 27(5):1047-53
- Kershaw and Flier. Adipose tissue as an endocrine organ. J. Clin. Endocrinol. Metab. 89(6), 2548-2556 (2004)
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Box plot shows the mean, 25th and 75th quartiles for hs CRP (mg/L), TNF α (pg/ml) and Chemerin (ng/ml) in three groups. X axis shows the study groups of Controls (n=29), DM (n=22) and NDM (n=23). Y axis shows the hsCRP (figure: 1), TNF α (figure: 2) and Chemerin (figure: 3) result obtained. Mann Whitney U test was applied for significant difference between Control vs. NDM, DM vs. Control and DM vs. NDM. p value <0.05 considered significant.

Table 2: ROC analysis

Biomarkers	Cases versus Controls (n=45 vs.29)			DM versus NDM (n=22 vs.24)			NDM versus Controls (n=23 vs.29)		
	AUC	p value	95%CI	AUC	p value	95%CI	AUC	p value	95%CI
hsCRP (mg/L)	0.710	0.002	0.587-0.832	0.795	0.001	0.662-0.929	0.586	0.289	0.429-0.743
TNF α (pg/ml)	0.538	0.584	0.405-0.670	0.291	0.015	0.133-0.449	0.655	0.051	0.504-0.806
Chemerin (ng/ml)	0.764	0.001	0.658-0.871	0.131	<0.001	0.008-0.257	0.963	<0.001	0.913-1.000

Receiver-operating characteristic (ROC) curve and corresponding area under the curve (AUC) statistics for the selected biomarkers was performed.

Figure 4-A: ROC curve for Cases versus Controls

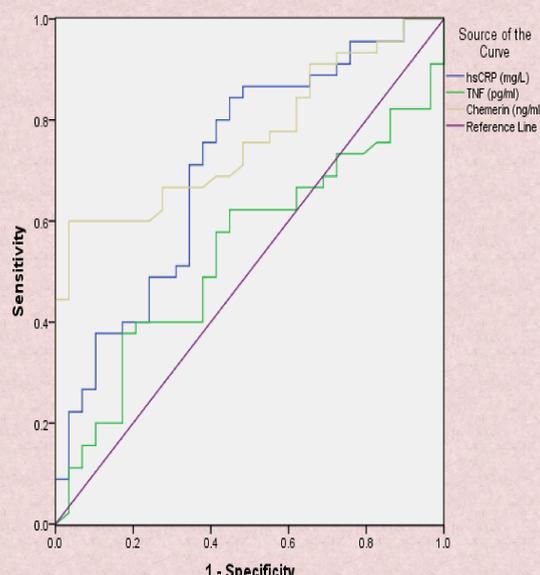


Figure 4-B: ROC curve for DM versus NDM

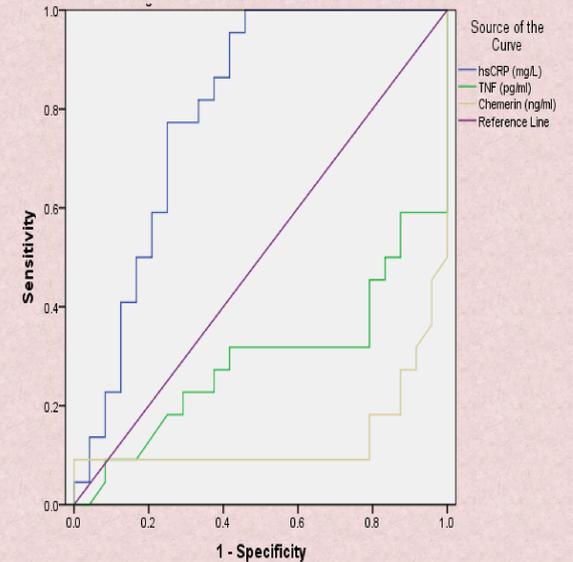
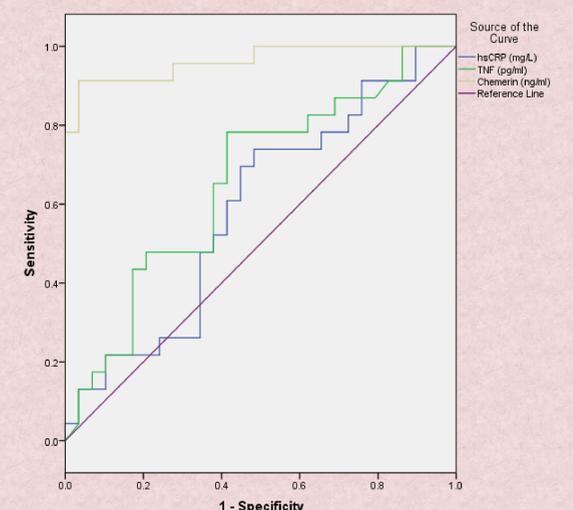


Figure 4-C: ROC curve for NDM versus Controls



Receiver operating characteristic (ROC) curve analysis was performed on hsCRP, TNF α and serum Chemerin: Figure 4-A between cases (n=45) and controls (n=29); Figure 4-B between DM (n=22) and NDM (n=24) and Figure 4-C between NDM (n=23) and controls (n=29).

Conclusions

- High chemerin level was observed in 23 NDM (p<0.01; MWU) compared to controls and DM. A strong positive association was also found between serum chemerin and FBS (p=0.029; r=0.254; data not shown)
- Both the hsCRP and TNF α levels were elevated in subjects with DM compared to controls (p<0.01). Similar increase in TNF α levels were also observed in NDM compared to DM (P<0.001)
- The preliminary findings suggest that chemerin may serve as a potential screening marker in diagnosis of DM or predicting the risk of development of diabetes in asymptomatic individual.

- Progression to clinical diabetes is associated with an increase inflammatory responses, which usually wanes off in established disease.

- Based on the ROC analysis serum chemerin levels between the range of 4.68-10.98 ng/ml had approximately 70% sensitivity and 60% specificity.

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- **Ethical Approval:** IRB (14/2/11/SSF/BMSI). All volunteers completed a verbal and written informed consent.