

PREDICTABILITY OF DIABETES MELLITUS TYPE 2 REMISSION AND CHANGES IN METABOLIC PROFILE AFTER BARIATRIC SURGERY USING DIAREM SCORING SYSTEM

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Background

- 28 Million people in the United States have Diabetes Mellitus (DM) type 2. (1)
- 70% of adults in US are considered overweight and 36% obese. (2)
- Estimated prevalence of obesity has doubled in the last 25 years. (3)
- Obesity increases the risk of developing DM type 2 and vice versa.
- Management of obesity in DM type 2 is important to prevent the complications of both conditions.
- Surgical therapies have proven to be superior to non surgical therapies for sustained weight loss as well as glycemic improvement. (4-6)

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Background (contd.)

- Different predictive models and scoring systems have been developed to determine the probability of diabetes remission following bariatric surgery
- DiaRem (Age, insulin use, HbA1c and diabetes medications) by Still et al.(7), ABCD (Age, BMI, C-peptide, and Duration) by Lee et al.(8), simple logistic and J48 decision tree models by Hayes et al.(9), logistics regressions model by Dixon et al.(10) and combination of logistic regression, decision trees, lasso regression by Cotillard et al.(11)
- DiaRem and ABCD scoring systems are easy to use as they do not involve complex statistical calculations.
- Validation studies for these scoring systems have been few and with mixed results (11-14).
- Since bariatric surgeries are associated with peri-operative complications, candidate patients should be selected carefully to identify those expected to derive the most benefits.

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Objectives

- To validate DiaRem scoring system to predict DM type 2 remission following Bariatric surgery.
- To predict changes in metabolic parameters – Systolic (SBP) and Diastolic (DBP) blood pressure, total cholesterol (TC), low density lipoprotein (LDL), high density lipoprotein (HDL) and triglycerides (TG) in patients with DM type 2 following bariatric surgery

Methods

- Retrospective review of Electronic Health record of patients who underwent bariatric surgery at Hennepin County Medical Center (HCMC), Minneapolis, MN from 2006 to 2015.
- Inclusion: Pre operative DM type 2.
- Exclusion: Age less than 18 years, DM type 1, less than 1 year of follow up.
- Data extracted by 2 independent study investigators who did not have clinical contact with the patients under review.
- Complete and partial remission of DM type 2 was defined as HbA1c < 6.0% and between 6.0% to 6.5% respectively.
- Chi-Square and Analysis of variance (ANOVA) tests were used to establish level of significance at 95% CI.

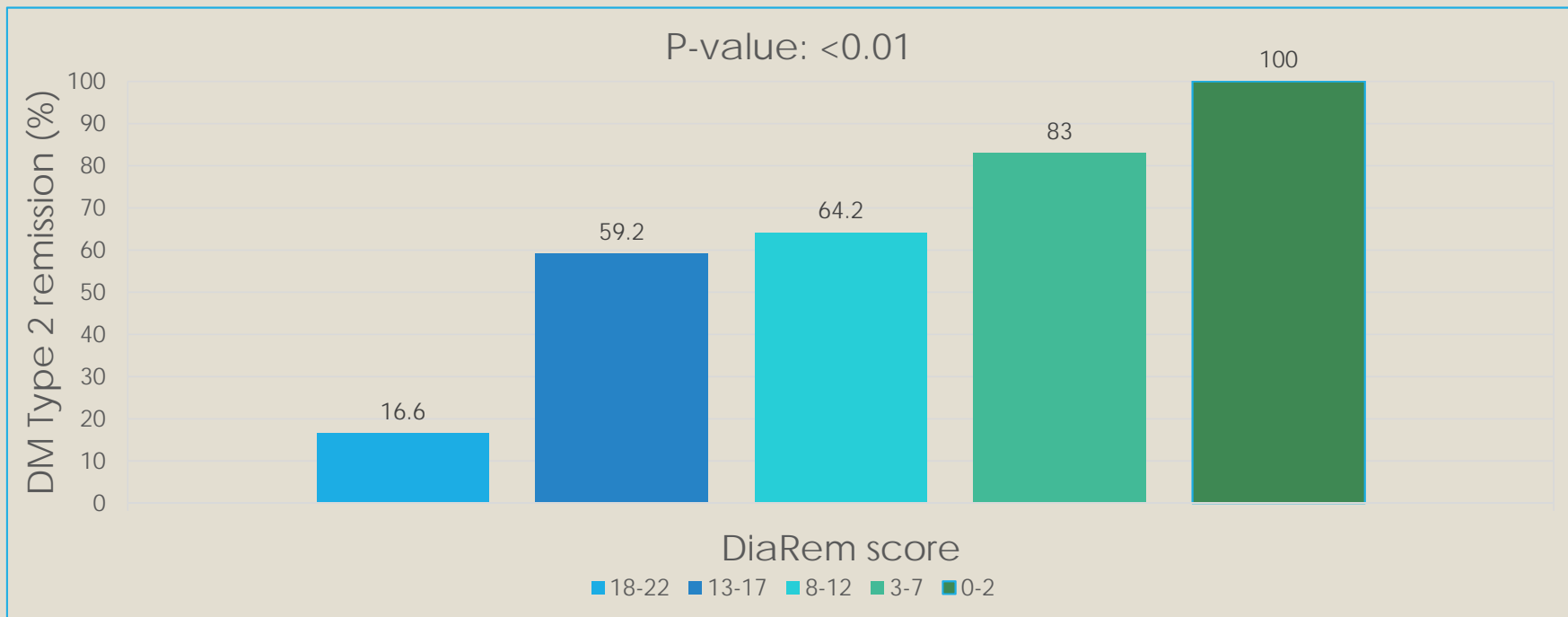
Results

- A total of 95 patients' data was available at the end of 1 year.
- 68 (72.4%) women and 27(27.6%) men
- 72 (76%) had Roux en Y Gastric bypass
- 23 (24%)had other bariatric procedures – Adjustable Gastric band, Sleeve Gastrectomy

Baseline Measurements

	Mean +/- SD
Age	48.2 +/-9.56 years
Baseline Weight	134.44 +/-30.18 kg
SBP	132 +/- 17 mmHg
DBP	80 +/- 11.3 mmHg
DM type2 duration	72.4 +/- 64.2 months
TC	181 +/- 48 mg/dl
LDL	108 +/- 36 mg/dl
HDL	41.1 +/- 9.64 mg/dl
TG	163 +/- 90 mg/dl
Hba1c	7.48% (5.2% to 12.1%)
Basal insulin	63.3 +/- 42 units daily
Bolus insulin	44 +/- 27.4 units daily

Patients with higher DiaRem score were less likely to achieve DM Type2 remission



Metabolic Parameters

Metabolic Parameter	DiaRem Groups										P-value
	0 - 2		3-7		8-12		13-17		18-22		
	Baseline	At 1 year	Baseline	At 1 year	Baseline	At 1 year	Baseline	At 1 year	Baseline	At 1 year	
SBP	124.6 +/- 15	125+/- 13.4	132.5+/-18.42	120.8 +/- 12.8	129+/-14.7	129.8+/- 15.8	133.5+/-17.3	130+/-16	135.1+/- 20.2	122.5+/- 17.5	0.14
DBP	76.14+/- 11	80+/-12.7	80.5+/-11.4	76.6+/- 11.14	75.64+/- 10.3	72.6+/- 9.8	83.2+/-11.3	78.5+/-11	78.8+/-10	73.8+/- 10.1	0.34
TC	159 +/- 33.4	156.28+/- 27.7	179.5+/-37	168.6+/- 32.3	172+/-41.8	163.6+/- 35	181.8+/-36.8	165.2+/- 46.7	200+/-58.6	171.7+/- 54.8	0.8
LDL	100.5+/-21	81.33 +/- 27.56	107.25+/-32.1	103.8+/- 34.8	97+/-43.17	107+/- 52.2	111+/-35.7	99.3+/- 39.1	115.7+/- 48.2	102.6+/- 49.4	0.5
HDL	40.25+/-11.8	55.16 +/- 19.5	40.6+/-9.5	50.5+/- 14.64	38.3+/-10	48.7+/- 11.8	42.4+/-8.86	48.72+/- 12.5	43.8+/-9.6	54.3+/- 14.5	0.61
TG	110+/-43.7	106.5+/- 46.1	158 +/- 100.5	109.7+/- 45.17	238+/-124.6	121.5+/- 73.3	152.52+/-70.7	122.3+/- 79.7	150.6+/- 40.7	110.8+/- 38.8	0.89



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- DiaRem scoring system was strongly predictive of combined (complete and partial) DM Type 2 remission (p-value < 0.001) and complete remission (p-value: < 0.001)
- It was not predictive for metabolic parameters including SBP, DBP, TC, LDL, HDL and TG.



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Discussion

- Bariatric surgery is associated with complications, significant costs and not all patients derive equal benefit.
- Therefore patients with high benefit potential should be considered for bariatric surgery.
- Among various predictive models DiaRem scoring system is more applicable in daily clinical practice.



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Conclusion

- We have demonstrated that DiaRem scoring system predicts DM Type 2 remission at 1 year following bariatric surgery.
- Further studies should assess the predictability of such scoring systems for longer term remission



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Thank you