

Obesity predicts New-Onset Diabetes after Living Kidney Donation

KL Lentine,¹ FM Koraihy,^{1,2} AS Naik,³ NN Lam,⁴ D Axelrod,⁵ MA Schnitzler,¹ Z Zhang,¹ H Xiao,¹ GP Hess,^{6,7} A X Garg,⁸ B L Kasiske,⁹ S Gustafson,⁹ DL Segev¹⁰
¹Saint Louis U, St. Louis, MO, USA; ²Saint Louis Veteran Affairs, St. Louis, MO, USA; ³U Michigan, Ann Arbor, MI, USA; ⁴University of Alberta, Edmonton, Alberta, Canada; ⁵Lahey Clinic, MA, USA; ⁶Symphony Health, Philadelphia, PA, USA; ⁷Leonard Davis Inst. Health Econ., U Penn, Philadelphia PA, USA ; ⁸Western Univ, London, Canada; ⁹SRTR, Minneapolis, MN, USA, ¹⁰Washington U, St. Louis, MO, USA; ¹¹Johns Hopkins U, Baltimore, MD, USA

Background

- Analyses of the outcome implications of obesity among living kidney donors (LKD) have led to conflicting conclusions.
- Better understanding of the relationship of obesity and post-donation diabetes mellitus (PDDM) may help inform donor evaluation, selection, and informed consent.

Methods

- We examined a novel linkage of national transplant registry data with records from a pharmacy claims clearinghouse that identifies diabetes treatments.
- Of 20,238 LKD with at least 1 year of pre-donation pharmacy fill records, 100 with diabetes medication fills before donation were excluded.
- Pharmacy fills for insulin and non-insulin diabetes agents were examined as measures of new-onset PDDM.
- Time to first fill of insulin or other diabetes agents in relation to body mass index (BMI), age, sex, race, and other clinical factors in the registry was examined by Kaplan-Meier analysis and Cox regression (adjusted hazard ratio, _{LCL} aHR _{UCL}).

Results

- Mean age at donation was 42.7 years.
- Of LKD, 67.5% were women; 75% were white, 10.5% black, and 10.9% Hispanic; 40.8% were overweight (BMI 25-<30 m²) and 22.8% were obese (BMI ≥30 kg/m²).
- The 5-year risk of non-insulin PDDM treatments rose in a graded manner with higher BMI, from 0.6% in normal weight to 3-fold increased risk in overweight (1.5%, aHR, _{1.76}3.05_{5.27}) and 3.4% in obese (3.4%, aHR, _{3.70}6.45_{11.03}) LKDs (**Figures 1 and 2**).
- Adjusted 5-year risk of insulin use after donation was 5 times higher in obese than in normal weight LKDs (1.1% vs. 0.04%, aHR, _{1.09}5.24_{25.3}) (**Figures 1 and 2**).
- Association of other baseline factors with PDDM treatments are shown in **Table 1**.
- Once PDDM treatments were started, use of non-insulin agents and insulin continued over 99% and 30% of remaining observations.

Acknowledgements

- National Institutes of Health (NIH)/National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), R01-DK096008.

Figure 1. Incidence of new-onset treatments for PDDM according to BMI at donation.

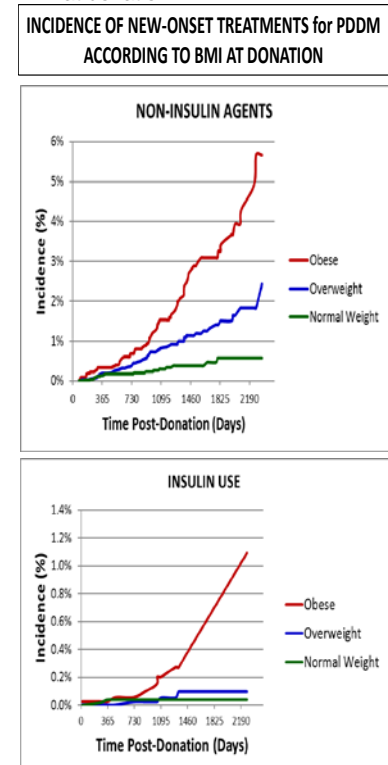
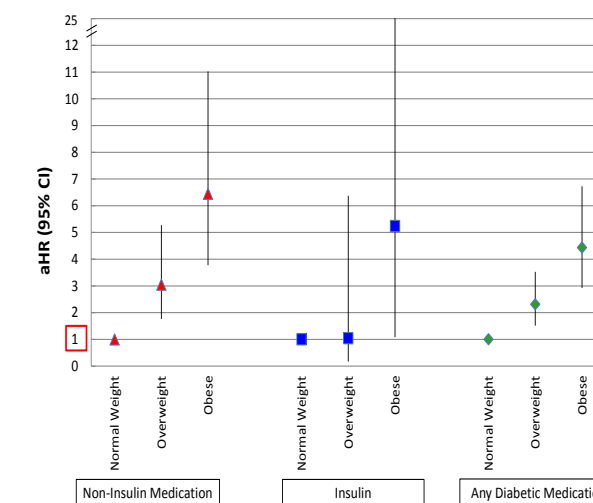


Table 1. Adjusted association of other baseline factors with diabetic medication use through 5 years after donation. Models include BMI level (as per Figure 2).

	Non-insulin medication	Insulin	Any diabetic medication
Donor characteristics	aHR (95% CL)	aHR (95% CL)	aHR (95% CL)
Donor age (year)	0.99 (0.98,1.01)	0.99 (0.95,1.04)	0.99 (0.97,1.00)*
Female	2.20 (1.46,3.33)†	0.31 (0.10,0.97)*	2.23 (1.56,3.20)‡
Donor race			
White	Reference	Reference	Reference
Black	0.98 (0.59,1.64)	0.58 (0.07,4.70)	1.08 (0.70,1.66)
Hispanic	1.36 (0.86,2.17)	0.66 (0.08,5.27)	1.38 (0.92,2.06)
Other	1.39 (0.56,3.42)	2.70 (0.34,21.48)	1.58 (0.77,3.23)
Body mass index (kg/m²)			
<18.5	N/A	N/A	N/A
18.5 to 24.9	Reference	Reference	Reference
25 to 29.9	3.05 (1.76,5.27)‡	1.04 (0.17,6.37)	2.31 (1.51,3.52)†
≥ 30	6.45 (3.77,11.03)‡	5.24 (1.09,25.26)*	4.43 (2.92,6.73)‡
Donor's insurance status			
Insured	Reference	Reference	Reference
No insurance	1.65 (1.05,2.59)*	N/A	N/A

P value: ‡ p<0.0001, † 0.0001<p<0.002, * 0.002<p<0.05.

Figure 2. Adjusted association of BMI at donation and new-onset treatments for PDDM after donation.



Conclusions

- Obesity and overweight status at the time of donation is a strong correlate of PDDM in LKD.
- Future research should define relationships of obesity and PDDM with outcomes including kidney failure after donation.

Authors have no conflicts of interest to report.