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Food Insecurity and Risk of Type 2 Diabetes Mellitus in Older Adults Living with HIV

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Background & Objective

- Food insecurity disproportionately affects vulnerable populations, including the elderly and those with chronic illnesses[1-3].
- The prevalence of food insecurity and type 2 diabetes mellitus (T2DM) have been documented to be higher in people living with HIV (PLWH) than among the general population.
- Older age, HIV, and food insecurity all individually increase the risk of developing T2DM.
- To examine how a history of food insecurity contributes to the development of T2DM in elderly PLWH.

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2. Paisible AL et al. HIV infection, cardiovascular disease risk factor profile, and risk for acute myocardial infarction. J Acquir Immune Defic Syndr 1999. 2015;68(2):209-216.;
3. Pham TV, et al. Human Immunodeficiency Virus Infection–Related Heart Disease. Emerg Med Clin North Am. 2015;33(3):613-622.

Methods

- Study Design: Prospective cohort study
- Study Population: Patients diagnosed with HIV from the University of California San Francisco 360 health clinic (UCSF 360 Clinic) and enrolled in the Silver Project Study.
- Inclusion Criteria: Age 50 or older, English speaking, and complete the food security data.
- Primary independent variables: Food insecurity and geriatric assessments including cognition, mental health, physical health, functional ability, social support, health related quality of life, and behavior and general health. Food insecurity was evaluated using a standard six-item indicator set for classifying households by the 12-month food security-scale.
- Dependent variable: Diagnosis of T2DM taken from electronic patient medical records using ICD-10 and ICD-9 codes.
- IRB Status: UCSF Approval #12-08879

Statistical Methods

- Chi square, Fisher's exact, and general association tests for contingency table data distribution analyses.
- Kaplan-Meier analysis for time to event (T2DM) analysis stratified by food security levels. Log-rank statistic measured significant differences across food security strata.
- Unadjusted Cox proportional hazard and multivariable stepwise elimination Cox models estimated hazard ratio and 95% confidence intervals and evaluate individual risk factors for T2DM.
- Participants with prior T2DM diagnosis were excluded from Kaplan-Meier and Cox analyses.

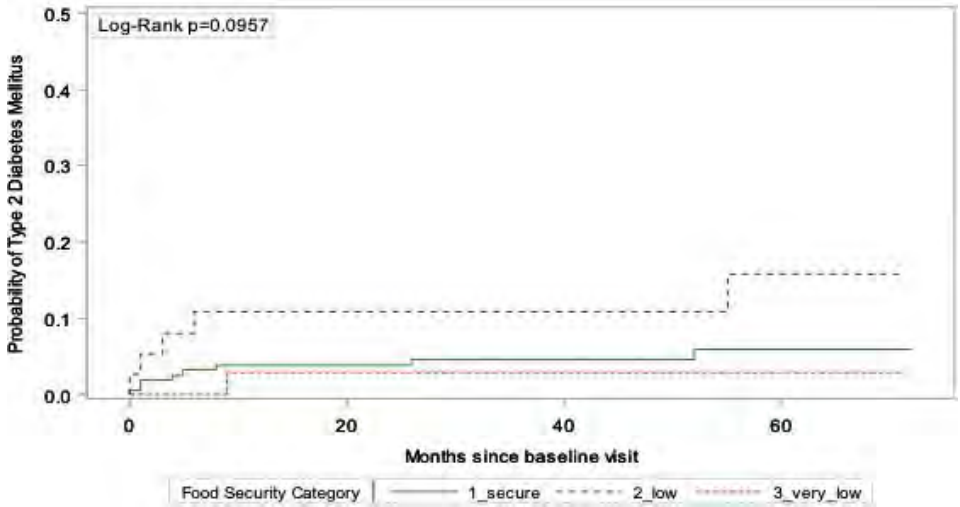
Results

Baseline Characteristics

- Of the 291 participants, the majority were aged 50-59 years old (63%), male (94%), had an education level of at least some college/college degree or more (82%), identified as homosexual (81%), non-smokers (77%), white (68%), and had an annual income of over $20,000 (54%). Among the 291 participants, 68% were food secure, 16% had low food security, and 16% had very low food security.
- Food security was more common among participants who are male, White, more educated, homosexual, non-smokers, have higher annual incomes >$80,000, and have undetectable HIV viral load.
- Food secure participants overall had lower frequency of loneliness, anxiety and depressive symptoms, lower cognitive impairment, better health-related quality of life, physical health and functional ability, lower frequency of problem alcohol and/or drug use and of death during follow-up, and higher frequency of medication adherence and social support compared to those with low/very low food security.

Kaplan-Meier time to event analyses

- Among the 360 Clinic participants without pre-existing T2DM (n=232), the estimated time from baseline to a T2DM diagnosis (n=14) did not differ based on food security status (p= 0.096).



Results

Unadjusted/Adjusted Cox HR for the risk of T2DM among participants

Cox Proportional Hazards Unadjusted Model:

- Participants who were screened as having loneliness (HR = 1.88; 95% CI 1.03-3.45) or abnormal cognition (HR = 3.23; 95% CI 1.01-10.30) had a higher risk of T2DM.

Cox Proportional Hazards Adjusted Model:

- Two predictors were associated with the development of T2DM: loneliness (HR = 2.00; 95% CI 1.05-3.84) and cognitive impairment (HR = 5.18; 95% CI 1.09-24.51).

HR = hazard ratio; CI = Confidence interval

Unadjusted/Adjusted Cox Hazard Ratios

TABLE 1: Unadjusted and adjusted Cox hazard ratios for the risk of T2DM among the 360 Clinic Participants

Baseline Characteristic	n	Unadjusted hazard ratio (95% CI)	P value		n	Adjusted hazard ratio (95% CI) for diabetes outcome	P value
Age (Decades)	232	0.91 (0.39-2.12)	0.82				
Birth Sex – Male	231	0.45 (0.10-2.04)	0.30				
Race	227						
Black		1.32 (0.36-4.83)	0.67				
White		1.08 (0.33-3.52)	0.90				
Non-white		0.93 (0.28-3.01)	0.90				
Education	232						
< High School		0.00 (0.00-)	0.99				
High School or GED		1.32 (0.22-7.93)	0.76				
Some college/college degree		1.19 (0.32-4.41)	0.79				
Annual Income	217						
<$10,000		1.57 (0.22-11.18)	0.65				
$10,000–20,000		3.13 (0.63-15.55)	0.16				
$20,001-40,000		0.93 (0.084-10.25)	0.95				
>$80,000		0.97 (0.087-10.68)	0.98				
Very low food security	232	0.38 (0.049-2.90)	0.35				
Poor/fair general health	228	2.57 (0.90-7.33)	0.0785				

GED = Graduate Equivalency Degree

Unadjusted/Adjusted Cox Hazard Ratios

TABLE 1: Unadjusted and adjusted Cox hazard ratios for the risk of T2DM among the 360 Clinic Participants

Baseline Characteristic	n	Unadjusted hazard ratio (95% CI)	P value		n	Adjusted hazard ratio (95% CI) for diabetes outcome	P value
Cognitive impairment abnormal (MoCA = 0-25)	230	3.23 (1.01-10.30)	0.0480		183	5.18 (1.09-24.51)	0.0383
Depressive symptoms (PHQ)	172						
Mild (5-9)		3.32 (0.74-14.96)	0.12				
Moderate (10-14)		1.34 (0.14-12.92)	0.80				
Severe (15-27)		3.85 (0.64-23.17)	0.14				
Anxiety (GAD7 = 5-21)	188	1.29 (0.39-4.24)	0.67				
Loneliness (ULS 17-20)	184	1.88 (1.03-3.45)	0.041		183	2.00 (1.05-3.84)	0.0362
Low perceived social support (SPS = 36-60)	177	2.57 (0.64-10.34)	0.19				
Low physical social support (LSNS = 0-12)	228	1.40 (0.49-4.01)	0.53				
Dependent for activities of daily living (ADL = 1-6)	225	0.86 (0.11-6.46)	0.84				
Problems with balance in past year	231	0.41 (0.054-3.17)	0.40				
Sedentary or underactive	228	1.77 (0.39-8.10)	0.46				
At risk alcohol or drug use	177	0.27 (0.034-2.18)	0.22				

MoCA: Montreal Cognitive Assessment; PHQ = Patient Health Questionnaire; GAD = Generalized Anxiety Disorder; ULS = UCLA 8-item Loneliness Scale; SPS = Social Provisions Scale; LSNS = Lubben Social Network Scale; ADL = activities of daily living

Limitations

- A relatively small sample of individuals who were followed for anywhere from one to seven years, some of whom had incomplete baseline information.
- Study population was mostly male (94%) and all participants received care at one clinic in San Francisco, which makes the results less generalizable to females, those receiving care elsewhere, and PLWH outside of the San Francisco Bay Area.

Strengths

- Used a comprehensive set of standardized scales and assessments to measure food security, cognition, mental health, physical health, functional ability, social support, behavioral and general health.
- One of the first studies to focus on an older population in relation to food insecurity and onset of T2DM.
- The prospective study design and the reliance on medical record diagnoses allowed for real-time collection of incidence events.

Conclusion

Among older PLWH, we did not to observe that a history of food insecurity contributed to the development of T2DM.

However, loneliness and cognitive impairment were significantly associated with the development of T2DM. This highlights the importance of performing geriatric assessments in this population to identify those in need of other clinical/social interventions to help lower the risk of T2DM in an at-risk populations.

Pharmacists help manage HIV and other chronic diseases—especially in the outpatient setting. Evaluating and screening patients who are 50 years old and above for both cognitive impairment and loneliness during HIV medication management counseling may alleviate some of the healthcare burdens of PLWH and potentially decrease the risk of incident T2DM.

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