Relationship between METS-IR and ABSI index and the Prevalence of Nocturia: A Cross-Sectional Analysis from the 2005-2020 NHANES Data

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Table 1. Baseline Characteristics of Nocturia in Adults Aged 20 Years and Older

Variables	Total (n = 16450)	Nocturia		*P*
		No (n = 11147)	Yes (n =5303)	
Age (years)	49.39 ± 17.57	46.21 ± 17.01	56.07 ± 16.84	<.001
HDL (mg/dl)	52.00 (42.00, 63.00)	51.00 (42.00, 62.00)	52.00 (43.00, 64.00)	0.008
TG (mg/dl)	101.00 (69.00, 150.00)	99.00 (68.00, 147.00)	106.00 (72.00, 156.00)	<.001
LDL (mg/dl)	110.00 (88.00, 135.00)	111.00 (89.00, 136.00)	108.00 (86.00, 134.00)	<.001
TC (mg/dl)	188.00 (163.00, 217.00)	189.00 (163.00, 217.00)	188.00 (161.00, 217.00)	0.341
Cr (mg/dl)	0.84 (0.70, 1.00)	0.84 (0.71, 0.99)	0.83 (0.70, 1.01)	0.182
BUN (mg/dl)	5.40 (4.40, 6.40)	5.40 (4.50, 6.30)	5.40 (4.40, 6.50)	0.07
BMI (kg/m²）	28.08 (24.40, 32.64)	27.60 (24.02, 31.90)	29.20 (25.30, 34.30)	<.001
METS-IR	41.56 (34.37, 50.22)	40.71 (33.62, 48.94)	43.34 (36.18, 52.79)	<.001
ABSI	81.60 (78.38, 84.89)	81.06 (77.93, 84.19)	82.88 (79.54, 86.27)	<.001
Gender (%)				<.001
Male	7959 (48.38)	5691 (51.05)	2268 (42.77)	
Female	8491 (51.62)	5456 (48.95)	3035 (57.23)	
Education level (%)				<.001
Less than high school graduate	3927 (23.87)	2269 (20.36)	1658 (31.27)	
High school graduate or GED	3800 (23.10)	2452 (22.00)	1348 (25.42)	
Some college or above	8723 (53.03)	6426 (57.65)	2297 (43.32)	
Race (%)				<.001
Mexican American	2561 (15.57)	1736 (15.57)	825 (15.56)	
Non-Hispanic white	1681 (10.22)	1118 (10.03)	563 (10.62)	
Non-Hispanic black	6987 (42.47)	4970 (44.59)	2017 (38.04)	

Other Hispanic	3418 (20.78)	1973 (17.70)	1445 (27.25)	
Other race/ethnicity	1803 (10.96)	1350 (12.11)	453 (8.54)	
Marital status (%)				<.001
Married/Living with a partner	6543 (39.78)	4237 (38.01)	2306 (43.48)	
Living alone	9907 (60.22)	6910 (61.99)	2997 (56.52)	
Income level (%)				<.001
Low income	10413 (63.30)	7422 (66.58)	2991 (56.40)	
Non-low income	6037 (36.70)	3725 (33.42)	2312 (43.60)	
Alcoholism (%)				<.001
No	6583 (40.02)	4119 (36.95)	2464 (46.46)	
Yes	9867 (59.98)	7028 (63.05)	2839 (53.54)	
Smoking status (%)				<.001
No	9046 (54.99)	6304 (56.55)	2742 (51.71)	
Yes	7404 (45.01)	4843 (43.45)	2561 (48.29)	
Hypertension (%)				<.001
No	10482 (63.72)	7849 (70.41)	2633 (49.65)	
Yes	5968 (36.28)	3298 (29.59)	2670 (50.35)	
Hyperlipidemia (%)				<.001
No	10461 (63.59)	7501 (67.29)	2960 (55.82)	
Yes	5989 (36.41)	3646 (32.71)	2343 (44.18)	
Diabetes Mellitus (%)				<.001
No	14235 (86.53)	10071 (90.35)	4164 (78.52)	
Yes	2215 (13.47)	1076 (9.65)	1139 (21.48)	
Coronary Heart Disease (%)				<.001
No	15812 (96.12)	10836 (97.21)	4976 (93.83)	
Yes	638 (3.88)	311 (2.79)	327 (6.17)	
Depressive Disorder (%)				<.001
No	12460 (75.74)	9016 (80.88)	3444 (64.94)	
Yes	3990 (24.26)	2131 (19.12)	1859 (35.06)	
METS quantile (%)				<.001
Q1	4113 (25.00)	3089 (27.71)	1024 (19.31)	
Q2	4112 (25.00)	2817 (25.27)	1295 (24.42)	
Q3	4112 (25.00)	2758 (24.74)	1354 (25.53)	
Q4	4113 (25.00)	2483 (22.28)	1630 (30.74)	
ABSI quantile (%)				<.001
Q1	4113 (25.00)	3122 (28.01)	991 (18.69)	
Q2	4112 (25.00)	2981 (26.74)	1131 (21.33)	
Q3	4112 (25.00)	2742 (24.60)	1370 (25.83)	
Q4	4113 (25.00)	2302 (20.65)	1811 (34.15)	

Data are presented as mean ± standard deviation, used to describe variables that follow a normal distribution.
Data are shown as median (first quartile, third quartile), used for variables that are skewed.
Percentages for categorical variables are calculated based on the frequency of observations in the sample.
Abbreviations: BMI: body mass index.;HDL:High-Density Lipoprotein； LDL:Low-Density Lipoprotein；TG:Triglycerides；TC:Total Cholesterol；Cr:Serum Creatinine；BUN:Blood Urea Nitrogen

Table2. Weighted Relationship Between METS-IR, ABSI, and Nocturia

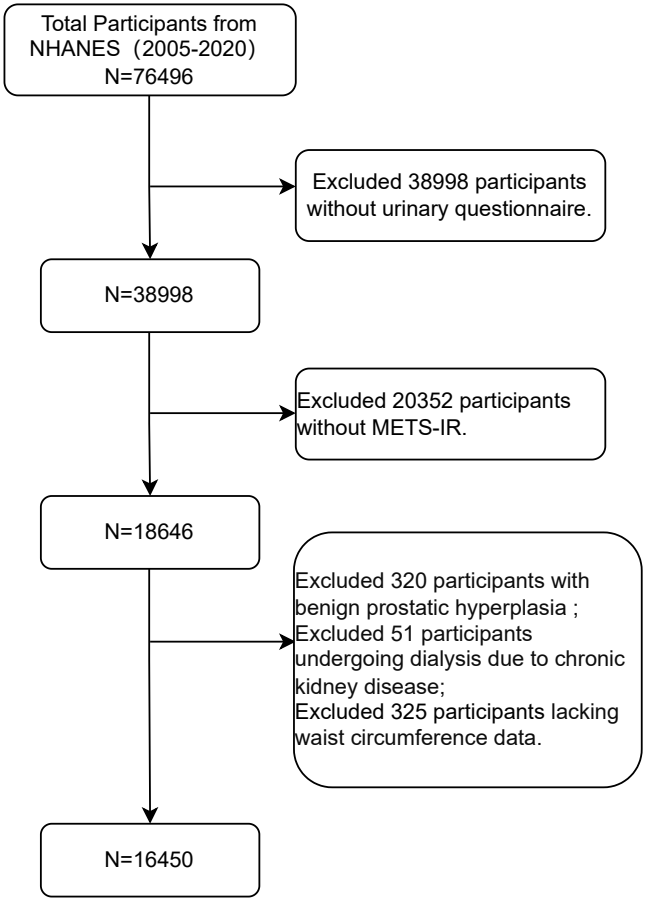
Variables	Model1	Model2	Model3
METS-IR	1.02 (1.02, 1.02) <0.0001	1.02 (1.02, 1.02) <0.0001	1.01 (1.01, 1.02) <0.0001
ABSI	1.08 (1.07, 1.08) <0.0001	1.03 (1.03, 1.04) <0.0001	1.03 (1.02, 1.04) <0.0001
METS-IR quartile			
Q1(17.14-34.37)	Reference	Reference	Reference
Q2(34.37-41.56)	1.39 (1.26, 1.53) <0.0001	1.22 (1.10, 1.35) 0.0002	1.18 (1.06, 1.31) 0.0019
Q3(41.56-50.22)	1.48 (1.35, 1.63) <0.0001	1.27 (1.14, 1.41) <0.0001	1.18 (1.06, 1.31) 0.0034
Q4(50.22-129.57)	1.98 (1.80, 2.18) <0.0001	1.81 (1.64, 2.01) <0.0001	1.53 (1.36, 1.71) <0.0001
ABSI quartile			
Q1(60.03-78.38)	Reference	Reference	Reference
Q2(78.38-81.6)	1.20 (1.08, 1.32) 0.0004	1.08 (0.97, 1.20) 0.1373	1.05 (0.94, 1.17) 0.3915
Q3(81.6-84.89)	1.57 (1.43, 1.73) <0.0001	1.21 (1.09, 1.35) 0.0004	1.15 (1.03, 1.28) 0.0124
Q4(84.89-111.47)	2.48 (2.26, 2.72) <0.0001	1.50 (1.34, 1.68) <0.0001	1.38 (1.23, 1.55) <0.0001

Odds ratios (ORs), 95% confidence intervals (CIs), and p-values are used to display the data. Model 1: unadjusted model. Model 2: adjusted for gender, race, age, income, marital status, and education level. Model 3: further adjusted for cholesterol, hypertension, cardiovascular disease, diabetes, smoking status, alcohol consumption, and depression based on Model 2.

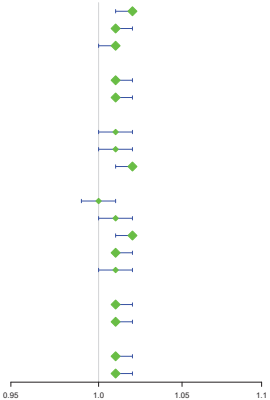
Table3. Analysis of the ABSI Index's Threshold Effect on the Prevalence of Nocturia Using a Two-Part Logistic Regression Model

ABSI index	Adjusted OR (95%CI), P-value
Model I	
Fitting by the standard linear model	1.03 (1.02, 1.04) <0.0001
Model II	
Inflection point	76.2
<76.2	0.97 (0.94, 1.01) 0.1323
> 76.2	1.04 (1.03, 1.05) <0.0001
Log likelihood ratio	0.002

Adjusted for gender, race, age, income, marital status, education level, cholesterol, hypertension, cardiovascular disease, diabetes, smoking status, alcohol consumption, and depression


Total Participants from NHANES (2005-2020) N=76496
Excluded 38998 participants without urinary questionnaire.
N=38998
Excluded 20352 participants without METS-IR.
N=18646
Excluded 320 participants with benign prostatic hyperplasia ;
Excluded 51 participants undergoing dialysis due to chronic kidney disease;
Excluded 325 participants lacking waist circumference data.
N=16450

Subgroup	OR(95%CI)	p value	p for interaction
Age (years)			**0.078**
20 − 38	1.02 (1.01, 1.02)	<0.0001	
39 − 58	1.01 (1.01, 1.02)	<0.0001	
59 − 85	1.01 (1.00, 1.01)	0.0019	
Gender			**0.930**
Male	1.01 (1.01, 1.02)	<0.0001	
Female	1.01 (1.01, 1.02)	<0.0001	
Education level			**0.407**
Less than high school graduate	1.01 (1.00, 1.02)	0.0006	
High school graduate or GED	1.01 (1.00, 1.02)	0.0004	
Some college or above	1.02 (1.01, 1.02)	<0.0001	
Race			**0.054**
Mexican American	1.00 (0.99, 1.01)	0.4489	
Non−Hispanic white	1.01 (1.00, 1.02)	0.0112	
Non−Hispanic black	1.02 (1.01, 1.02)	<0.0001	
Other Hispanic	1.01 (1.01, 1.02)	<0.0001	
Other race/ethnicity	1.01 (1.00, 1.02)	0.0358	
Income level			**0.886**
Low income	1.01 (1.01, 1.02)	<0.0001	
Non−low income	1.01 (1.01, 1.02)	<0.0001	
Marital status			**0.639**
Married/Living with a partner	1.01 (1.01, 1.02)	<0.0001	
Living alone	1.01 (1.01, 1.02)	<0.0001	



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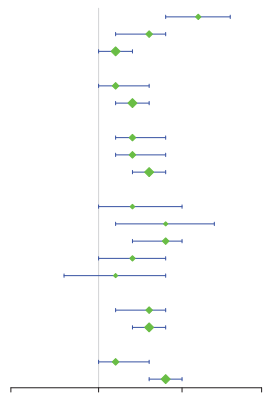
Subgroup	OR(95%CI)	p value	p for interaction
Age (years)			**0.078**
20 − 38	1.06 (1.04, 1.08)	<0.0001	
39 − 58	1.03 (1.01, 1.04)	0.0007	
59 − 85	1.01 (1.00, 1.02)	0.0699	
Gender			**0.377**
Male	1.01 (1.00, 1.03)	0.1222	
Female	1.02 (1.01, 1.03)	<0.0001	
Education level			**0.824**
Less than high school graduate	1.02 (1.01, 1.04)	0.0056	
High school graduate or GED	1.02 (1.01, 1.04)	0.0048	
Some college or above	1.03 (1.02, 1.04)	<0.0001	
Race			**0.168**
Mexican American	1.02 (1.00, 1.05)	0.0801	
Non−Hispanic white	1.04 (1.01, 1.07)	0.0048	
Non−Hispanic black	1.04 (1.02, 1.05)	<0.0001	
Other Hispanic	1.02 (1.00, 1.04)	0.0265	
Other race/ethnicity	1.01 (0.98, 1.04)	0.6363	
Income level			**0.7139**
Low income	1.03 (1.01, 1.04)	<0.0001	
Non−low income	1.03 (1.02, 1.04)	<0.0001	
Marital status			**0.008**
Married/Living with a partner	1.01 (1.00, 1.03)	0.0654	
Living alone	1.04 (1.03, 1.05)	<0.0001	



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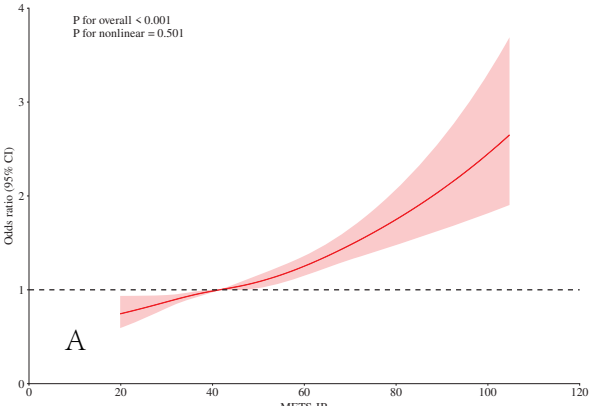
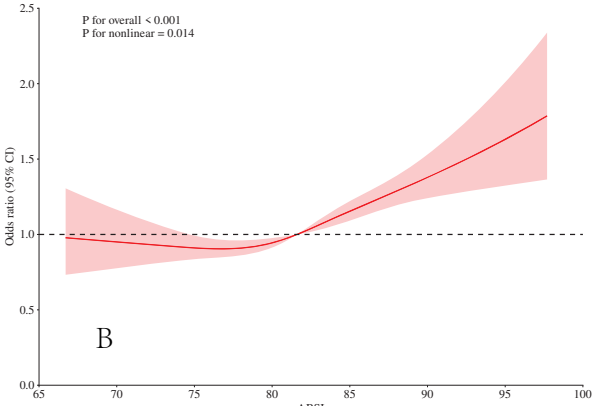

P for overall < 0.001
P for nonlinear = 0.501
Odds ratio (95% CI)
METS-IR
A


P for overall < 0.001
P for nonlinear = 0.014
Odds ratio (95% CI)
ABSI
B