

Supplementary Table SI. Comparison of baseline characteristics between included and excluded participants

Variable	Included	Excluded	P value
RFM, %	35 ± 12.92	30.29 ± 14.54	<0.001
Height, cm	1.58 ± 0.09	1.58 ± 0.09	0.307
Waist, cm	89.88 ± 11.74	82.51 ± 12.38	<0.001
BMI, kg/m ²	26.05 ± 42.37	23.55 ± 33.4	0.002
Age, year	59.07 ± 9.09	58.83 ± 10.41	0.189
WBC, ×10 ⁹ /L	6.44 ± 1.93	6.18 ± 2.18	<0.001
BUN, mg/dl	15.46 ± 4.47	15.86 ± 4.71	<0.001
GLU, mg/dl	125.73 ± 48.4	104.19 ± 29.77	<0.001
SCR, μmol/L	0.79 ± 0.29	0.78 ± 0.21	0.419
TC, mg/dl	199.91 ± 41.73	190.22 ± 37.36	<0.001
TG, mg/dl	183.51 ± 143.43	115.7 ± 86.79	<0.001
HDL-C, mg/dl	43.84 ± 13.3	53.61 ± 15.2	<0.001
LDL-C, mg/dl	118.42 ± 38.75	115.04 ± 33.23	<0.001
CRP, mg/l	3.01 ± 7.2	2.72 ± 7.79	0.056
HA1bc, %	5.51 ± 1.09	5.16 ± 0.67	<0.001
UA, mg/dl	4.6 ± 1.29	4.41 ± 1.25	<0.001
HGB, g/dL	14.53 ± 2.26	14.33 ± 2.2	<0.001
Gender			<0.001
Female	1309 (39.7%)	7170 (49.8%)	
Male	1992 (60.3%)	7235 (50.2%)	
Marital status			0.002
No	369 (11.2%)	1889 (13.1%)	
Yes	2932 (88.8%)	12485 (86.9%)	
Hukou type			0.243
Urban hukou	1367 (41.4%)	5804 (40.3%)	
Rural hukou	1934 (58.6%)	8603 (59.7%)	
Heart diseases			<0.001
No	2819 (85.6%)	12518 (88.3%)	
Yes	474 (14.4%)	1656 (11.7%)	
Stroke			0.236
No	3195 (96.9%)	13845 (97.3%)	
Yes	102 (3.1%)	384 (2.7%)	
Drinking status			<0.001
Never	2095 (63.5%)	8238 (57.2%)	
Ever	346 (10.5%)	1481 (10.3%)	
Current	860 (26.1%)	4520 (31.4%)	
Smoking status			<0.001
Never	2207 (66.9%)	8412 (58.4%)	
Ever	312 (9.5%)	1114 (7.7%)	
Current	782 (23.7%)	4080 (28.3%)	
Education level			<0.001

No completion of primary school	1548 (46.9%)	6469 (45.1%)	
Sishu/home school/elementary school	731 (22.2%)	2996 (20.9%)	
Middle school	678 (20.6%)	2991 (20.8%)	
High school and above	342 (10.4%)	1891 (13.2%)	
Hypertension			<0.001
No	1134 (34.4%)	8721 (61.4%)	
Yes	2167 (65.6%)	5487 (38.6%)	
Diabetes			<0.001
No	2225 (67.4%)	13090 (92.6%)	
Yes	1076 (32.6%)	1039 (7.4%)	

Abbreviations: RFM, relative fat mass; BMI, body mass index; WBC, white blood cell count; BUN, blood urea nitrogen; GLU, glucose; SCR, serum creatinine; TC, total cholesterol; TG, triglycerides; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; CRP, C-reactive protein; HbA1c, glycated hemoglobin; UA, uric acid; HGB, hemoglobin.

Supplementary Table SII. Piece-wise Cox regression analysis of the association between RFM and symptomatic KOA risk

RFM range	HR	95% CI	P value
≤ 28.95%	0.994	0.988–1.001	0.064
> 28.95%	1.035	1.020–1.050	< 0.001

Footnotes: Threshold identified by grid search maximizing log-likelihood of piece-wise Cox model. Model adjusted for age, rural residence, education, hypertension, diabetes, marital status, smoking, drinking, BMI, triglycerides, HDL, LDL, and CRP. HR per 1% increase in RFM within each segment. P values from Wald tests.

Supplementary Table SIII. Subgroup analyses of the association between RFM and KOA incidence with FDR adjustment

Variable	HR (95% CI)	P	P for interaction	q-value*
Age			0.557	
<60	1.019 (1.009, 1.029)	<0.001		0.001
≥60	1.014 (1.004, 1.025)	0.008		0.019
BMI			0.360	
<28.5	1.014 (1.006, 1.022)	<0.001		0.002
≥28.5	1.023 (1.005, 1.041)	0.012		0.023
Gender			0.478	
Female	1.003 (0.995, 1.019)	0.44		0.558
Male	0.999 (0.989, 1.008)	0.77		0.877

Marital status			0.794	
Yes	1.016 (1.009, 1.024)	<0.001		0.002
No	1.020 (0.996, 1.044)	0.11		0.158
Hukou			0.046	
Rural	1.023 (1.014, 1.034)	<0.001		0.001
Urban	1.009 (1.000, 1.019)	0.065		0.097
Hypertension			0.065	
Yes	1.026 (1.013, 1.039)	<0.001		0.001
No	1.011 (1.003, 1.020)	0.008		0.018
Diabetes			0.816	
Yes	1.018 (1.006, 1.030)	0.003		0.01
No	1.016 (1.007, 1.025)	<0.001		0.002
Alcohol consumption			0.429	
Never	1.011 (1.002, 1.019)	0.014		0.025
Ever	1.003 (0.989, 1.019)	0.66		0.786
Current	1.020 (1.001, 1.039)	0.04		0.064
Smoking			0.780	
Never	1.013 (1.004, 1.022)	0.005		0.013
Ever	1.003 (0.976, 1.032)	0.81		0.881
Current	1.009 (0.993, 1.025)	0.28		0.368
Education			0.075	
No completion of primary school	1.018 (1.007, 1.029)	0.001		0.004
Sishu/home school/elementary school	1.022 (1.006, 1.039)	0.008		0.016
Middle school	1.001 (0.989, 1.014)	0.87		0.91
High school and above	1.001 (0.986, 1.015)	0.95		0.948

Footnotes: FDR-adjusted q-values were calculated using the Benjamini-Hochberg procedure across all subgroup-specific P-values. P-values <0.001 were set to 0.0009 for q-value computation.