

**Table S1: Clinical symptoms in older South Asian, White European and African Caribbean men**

Parameter	South Asian (SA) N=174	White European (WE) N=311	African Caribbean (AC) N=157	p-value SA vs. WE	p-value SA vs. AC	p-value WE vs. AC
Decreased morning erections, n(%)	45 (41.3)	90 (33.5)	29 (24.0)	>.050	>.050	<b>&lt;.050</b>
Decreased sexual thoughts, n(%)	47 (39.8)	47 (17.6)	27 (23.9)	<b>&lt;.050</b>	>.050	>.050
Erectile dysfunction, n(%)	43 (39.1)	92 (35.0)	29 (23.6)	>.050	>.050	<b>&lt;.050</b>
Decreased vigorous activity, n(%)	50 (31.5)	90 (29.2)	22 (14.4)	>.050	<b>&lt;.050</b>	<b>&lt;.050</b>
Limited walking, n(%)	28 (17.5)	20 (6.5)	9 (6.0)	<b>&lt;.050</b>	<b>&lt;.050</b>	>.050
Inability to bend, n(%)	28 (17.4)	12 (3.9)	10 (6.5)	<b>&lt;.050</b>	<b>&lt;.050</b>	>.050
Fatigue, n(%)	24 (14.6)	10 (3.2)	6 (3.9)	<b>&lt;.050</b>	<b>&lt;.050</b>	>.050
Loss of energy, n(%)	30 (18.2)	13 (4.2)	8 (5.2)	<b>&lt;.050</b>	<b>&lt;.050</b>	>.050
Sadness, n(%)	14 (8.6)	9 (2.9)	8 (5.2)	<b>&lt;.050</b>	>.050	>.050

**Data are expressed as number and percentage**

Clinical symptoms were assessed using criteria proposed by Wu et al., NEJM (2010)

Group comparison p-values were calculated using the Z-test

<b>Table S2: Total and free testosterone levels across BMI categories</b>					
<b>Older South Asian men</b>			<b>Model 1 Unadjusted</b>		
<b>Lean weight</b> N=33	<b>Overweight</b> N=92	<b>Obese</b> N=41	<b>Lean vs. overweight</b>	<b>Lean vs. obese</b>	<b>Overweight vs. obese</b>
15.7 ±0.9	13.7 ±0.5	14.2 ±0.9	p=0.174	p=0.609	p=1.000
7.3 – 31.6	4.5 – 25.7	5.6 – 35.8			
<b>Older White European men</b>			<b>Model 1 Unadjusted</b>		
<b>Lean weight</b> N=76	<b>Overweight</b> N=141	<b>Obese</b> N=64	<b>Lean vs. overweight</b>	<b>Lean vs. obese</b>	<b>Overweight vs. obese</b>
20.1 ±0.7	16.6 ±0.4	13.5 ±0.6	p<.001	p<.001	p<.001
3.8 – 33.7	7.0 – 29.4	1.6 – 28.5			
<b>Older African Caribbean men</b>			<b>Model 1 Unadjusted</b>		
<b>Lean weight</b> N=38	<b>Overweight</b> N=87	<b>Obese</b> N=27	<b>Lean vs. overweight</b>	<b>Lean vs. obese</b>	<b>Overweight vs. obese</b>
19.4 ±0.9	18.1 ±0.6	13.7 ±0.8	p=0.652	p<.001	p=0.001
7.4 – 29.5	0.5 – 31.9	6.1 – 20.6			
Data are presented as mean ±SEM total testosterone levels (nmol/L) and range (min – max) Lean weight [BMI<25 kg/m <sup>2</sup> ], overweight [BMI 25 - 29.99 kg/m <sup>2</sup> ] and Obese [BMI≥30 kg/m <sup>2</sup> ] are based on body mass index (BMI) categories Group comparison p-values were calculated using analysis of variance					
<b>Older South Asian men</b>			<b>Model 1 Unadjusted</b>		
<b>Lean weight</b> N=32	<b>Overweight</b> N=88	<b>Obese</b> N=40	<b>Lean vs. overweight</b>	<b>Lean vs. obese</b>	<b>Overweight vs. obese</b>
293.9 ±15.8	288.2 ±8.7	307.7 ±25.2	p=1.000	p=1.000	p=1.000
138.1 – 593.2	99.4 – 546.3	144.6 – 1134.1			
<b>Older White European men</b>			<b>Model 1 Unadjusted</b>		
<b>Lean weight</b> N=76	<b>Overweight</b> N=141	<b>Obese</b> N=64	<b>Lean vs. overweight</b>	<b>Lean vs. obese</b>	<b>Overweight vs. obese</b>
330.1 ±13.3	297.6 ±6.4	258.4 ±11.3	p=0.040	p<0.001	p=0.014
54.4 – 814.1	139.3 – 521.5	34.3 – 513.7			
<b>Older African Caribbean men</b>			<b>Model 1 Unadjusted</b>		
<b>Lean weight</b> N=37	<b>Overweight</b> N=84	<b>Obese</b> N=26	<b>Lean vs. overweight</b>	<b>Lean vs. obese</b>	<b>Overweight vs. obese</b>
350.8 ±16.9	346.2 ±10.5	282.9 ±15.0	p=1.000	p=0.018	p=0.010
118.1 – 556.5	5.8 – 588.2	135.2 – 416.0			
Data are presented as mean ±SEM free testosterone levels (pmol/L) and range (min – max) Lean weight [BMI<25 kg/m <sup>2</sup> ], overweight [BMI 25 - 29.99 kg/m <sup>2</sup> ] and Obese [BMI≥30 kg/m <sup>2</sup> ] are based on body mass index (BMI) categories Group comparison p-values were calculated using analysis of variance					

<b>Table S3: Multivariable-adjusted male reproductive hormone levels in older South Asian, White European and African Caribbean men</b>						
Parameter	South Asian (SA)	White European (WE)	African Caribbean (AC)	SA vs. WE	SA vs. AC	WE vs. AC
	Multivariable-adjusted	Multivariable-adjusted	Multivariable-adjusted			
	N=174	N=311	N=157			
Total testosterone, nmol/L	15.0±0.7	17.1±0.4	15.8±0.6	<b>0.035</b>	1.000	0.323
Free testosterone, pmol/L	286±12	312±7	290±12	0.283	1.000	0.428
SHBG, nmol/L	38.4±1.9	40.2±1.1	39.9±1.8	1.000	1.000	1.000
LH, U/L	7.1±0.5	5.6±0.3	6.3±0.4	<b>0.014</b>	0.470	0.540

Adjusted for age, frequent alcohol intake, smoking (current), body fat (%), HOMA-IR and comorbidity burden (≥1 comorbidities)  
Abbreviations: N, sample size; SHBG, Sex Hormone-Binding Globulin; LH, Luteinizing Hormone

**Table S4: Summary of the results of Multiple Linear Regression analysis (MLR) and Univariate Linear Regression analysis (ULR) investigating the relationship between the covariates used in the study and their association with male reproductive hormone levels in the 3 ethnic groups. The table shows the individual hormones (in shaded banner) and ethnic groups with which significant relationships (p<0.05) were observed.**

Predictors – MLR	TT	FT	SHBG	LH
Study age	AC	SA, WE, AC	SA, WE, AC	SA, WE
Frequent Alcohol (≥5 d/week)		AC		
Smoking				
BMI	WE, AC	WE, AC	WE, AC	AC
Waist circumference	WE, AC	WE, AC	WE, AC	AC
Body fat	WE, AC	WE, AC	WE, AC	
HOMA-IR				
≥1 illnesses				
Predictors – ULR	TT	FT	SHBG	LH
Study age	AC	SA, WE, AC	SA, WE, AC	SA, WE
Frequent Alcohol (≥5 d/week)				
Smoking		SA		
BMI	WE, AC	WE, AC	SA, WE, AC	AC
Waist circumference	SA, WE, AC	AC	WE, AC	
Body fat	WE, AC	WE, AC	WE, AC	
HOMA-IR	WE, AC	WE, AC		WE
≥1 illnesses	SA, WE, AC	SA, WE, AC		SA, WE

**Table S5. K(5)-fold cross validation of reproductive hormone level - BMI regression analyses**

Outcome and ethnic group	Means squared error values across Est1 – Est5									
	Age-adjusted					age, alcohol intake, smoking, HOMA-IR and comorbidity burden adjusted				
<b>Total testosterone</b>										
South Asian	5.75	4.70	5.82	4.90	3.98	8.54	4.65	5.57	5.33	4.81
White European	5.36	5.03	4.70	5.28	5.62	5.46	5.89	4.58	5.24	5.23
African Caribbean	5.46	4.85	4.86	4.44	5.18	4.97	4.08	4.16	5.76	8.50
<b>Free testosterone</b>										
South Asian	82.84	86.48	169.72	80.24	83.49	84.66	82.23	276.62	137.49	98.79
White European	98.01	86.17	73.68	76.35	72.60	70.92	77.05	87.99	104.49	71.47
African Caribbean	69.34	86.74	80.46	74.37	86.64	71.52	82.97	79.87	92.44	86.53
<b>SHBG</b>										
South Asian	12.48	14.68	10.52	17.62	17.84	16.79	18.56	14.47	17.92	16.14
White European	16.55	12.22	14.45	12.70	16.89	14.57	17.59	14.15	12.76	16.99
African Caribbean	15.98	13.60	13.83	13.86	13.87	17.77	12.33	10.30	16.96	24.59
<b>LH</b>										
South Asian	2.81	3.33	2.97	2.79	2.52	2.48	4.35	2.97	3.01	2.99
White European	2.25	3.05	8.85	2.62	2.96	3.04	5.29	3.43	4.25	3.15
African Caribbean	2.63	1.91	3.44	2.98	2.17	2.33	5.02	2.84	2.36	1.85

Est values represent mean squared error values across the 5 folds and are provided from Est1 (left) to Est5 (right)

EST values for age-adjusted models were calculated using linear regression and 5-fold cross-validation

EST values for fully adjusted models were calculated using linear regression with adjustments for study age and frequent alcohol intake together with 5-fold cross-validation

Our linear regression analyses showed good internal consistency, since the differences in mean squared error values across the folds remained more-or-less constant and were similar across the 3 ethnic groups

**Table S6. K(5)-fold cross validation of reproductive hormone level - waist circumference regression analyses**

Outcome and ethnic group	Means squared error values across Est1 – Est5									
	Age-adjusted					age, alcohol intake, smoking, HOMA-IR and comorbidity burden adjusted				
<b>Total testosterone</b>										
South Asian	5.24	6.07	3.98	4.72	4.69	3.26	5.91	5.64	6.05	7.67
White European	5.01	4.47	5.72	4.79	5.23	5.36	5.19	4.85	5.16	5.36
African Caribbean	5.41	5.23	4.22	5.29	4.67	6.60	3.96	4.32	7.46	4.16
<b>Free testosterone</b>										
South Asian	79.60	74.23	81.22	73.81	184.67	69.89	250.62	113.77	95.79	109.09
White European	92.06	75.33	68.54	84.71	74.96	72.72	71.49	91.67	72.02	101.67
African Caribbean	86.05	66.23	84.09	79.24	86.13	56.21	89.84	104.69	57.83	72.51
<b>SHBG</b>										
South Asian	11.92	16.79	15.28	16.92	14.74	17.41	17.80	16.38	17.74	17.69
White European	14.99	15.50	16.42	15.24	13.45	14.45	14.83	12.76	19.15	14.54
African Caribbean	13.54	12.50	14.44	15.46	13.36	13.80	18.08	15.47	15.23	19.16
<b>LH</b>										
South Asian	3.00	2.83	3.48	2.27	2.63	1.89	2.72	3.65	2.79	3.58
White European	4.10	2.68	3.94	6.74	5.02	5.65	2.60	3.42	2.62	4.62
African Caribbean	2.71	2.12	2.74	2.44	2.81	3.57	2.14	4.41	2.69	1.40

Est values represent mean squared error values across the 5 folds and are provided from Est1 (left) to Est5 (right)

EST values for age-adjusted models were calculated using linear regression and 5-fold cross-validation

EST values for fully adjusted models were calculated using linear regression with adjustments for study age and frequent alcohol intake together with 5-fold cross-validation

Our linear regression analyses showed good internal consistency, since the differences in mean squared error values across the folds remained more-or-less constant and were similar across the 3 ethnic groups

**Table S7. K(5)-fold cross validation of reproductive hormone level - body fat (%) regression analyses**

Outcome and ethnic group	Means squared error values across Est1 – Est5									
	Age-adjusted					age, alcohol intake, smoking, HOMA-IR and comorbidity burden adjusted				
<b>Total testosterone</b>										
South Asian	5.48	4.16	5.77	4.48	4.48	6.05	5.67	7.91	4.42	4.06
White European	5.30	5.43	5.55	4.74	5.35	5.91	6.08	4.08	4.19	6.22
African Caribbean	5.61	5.45	4.37	4.42	5.10	6.21	4.97	6.95	3.79	4.47
<b>Free testosterone</b>										
South Asian	76.65	174.46	61.99	86.23	79.51	79.84	259.62	75.28	82.17	119.56
White European	81.97	88.36	71.04	94.90	71.78	73.10	70.25	79.86	86.77	114.68
African Caribbean	72.16	93.03	84.78	55.64	92.19	100.25	72.56	77.70	69.11	78.53
<b>SHBG</b>										
South Asian	12.54	16.49	17.35	14.70	12.72	14.99	12.30	17.90	24.35	17.07
White European	14.39	13.53	16.13	15.84	13.40	16.38	12.77	14.29	11.52	20.79
African Caribbean	13.58	12.51	17.88	10.93	13.35	14.56	13.63	17.10	20.03	9.52
<b>LH</b>										
South Asian	3.56	2.63	2.60	2.76	2.63	2.84	3.79	2.93	2.20	3.34
White European	3.61	3.18	3.28	6.83	5.88	3.04	2.92	4.36	5.80	2.64
African Caribbean	2.62	1.60	2.51	3.12	2.61	2.62	2.24	2.12	2.49	5.86

Est values represent mean squared error values across the 5 folds and are provided from Est1 (left) to Est5 (right)

EST values for age-adjusted models were calculated using linear regression and 5-fold cross-validation

EST values for fully adjusted models were calculated using linear regression with adjustments for study age and frequent alcohol intake together with 5-fold cross-validation

Our linear regression analyses showed good internal consistency, since the differences in mean squared error values across the folds remained more-or-less constant and were similar across the 3 ethnic groups

**S8. DEXA measurements of total body fat are strongly related to BMI, waist circumference and skin calliper body fat (%) content across ethnic groups**

Outcome and ethnic group	Spearman correlation analysis		
	Sample size	Spearman's rho	p-value*
<b>DEXA total body fat – body mass index</b>			
South Asian	n=56	0.805	<.001
White European	n=202	0.817	<.001
African Caribbean	n=36	0.682	<.001
<b>DEXA total body fat – waist circumference</b>			
South Asian	n=55	0.821	<.001
White European	n=207	0.867	<.001
African Caribbean	n=35	0.836	<.001
<b>DEXA total body fat – skin calliper body fat</b>			
South Asian	n=55	0.686	<.001
White European	n=204	0.746	<.001
African Caribbean	n=35	0.781	<.001
*P-values provide test of the null hypothesis that DEXA total body fat measurements are independent of body mass index, waist circumference or skin calliper body fat measurements.			