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CLINICAL ASSOCIATIONS OF PERCEIVED WELL-BEING IN OBESE SUBJECTS: A FOCUS ON LABORATORY MEASUREMENTS

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OBJECTIVES

To document clinical associations of perceived well-being (PWB) in obese subjects

SUBJECTS AND METHODS

Prospectively collected 'Obesity Polyclinic' database was retrospectively analyzed for the answers of the questionnaries fullfilled during the initial evaluation for obesity. After exclusion unavailable cases, the answers to the question '*how do you describe your general health/well-being? i) excellent ii) good iii) fair iv) poor v) extremely poor'* each were categorized, and these groups were compared for BMI per se, total body fat content, waist–hip ratio, fasting plasma glucose, HOMA-IR, LDL-C, HDL-C, TSH, anti-thyroid peroxidase, free thyroxine, hemoglobin, creatinine, transaminases, 25(OH)D, albumin levels. As a secondary analysis, the associations of the symptoms with the PWB were examined.

Exclusion Criteria: Medications with glucocorticoids or antipsychotics, Cushing syndrome, thyrotoxicosis, pituitary insufficiency, uncontrolled diabetes mellitus (requirement of insulin or oral antidiabetics other than metformin, HbA1c ≥ 8%, fasting plasma glucose ≥ 180 mg/dL, and presence of any microvascular or macrovascular complications of diabetes), chronic kidney disease, chronic liver disease, bronchial asthma, rheumatoid arthritis, other rheumatological diseases, psychosis, or mental retardation were excluded.

RESULTS

During the study period, who satisfied the inclusion criteria, 623 subjects (M/F: 69/554, median 42-year-old with a BMI of 34.6 kg/m^2) had completed the initial evaluation form. The distribution of answers to PWB was as 89 (14.3%) good, 269 (43.2%) fair, 229 (36.7%) poor, and 36 (5.8%) extremely poor. Nervousness, sleep disturbances, headache, depressive mood, lassitude correlated with PWB (Table 1, 2).

The curve estimation demonstrated independent associations of increasing PWB scores with higher levels of 25(OH)D, albumin, and HDL-C, but no association with HOMA-IR or presence of metabolic syndrome or TSH or anti-thyroid peroxidase levels.

Further, both 25(OH)D and albumin levels associated with the number of symptoms also (i.e. 68.8% of subjects with 25(OH)D levels ≥ 30 ng/ml had 0–1 symptom, 25.0% had 2–3 symptoms, and 6.2% had 4–5 symptoms; whereas this distribution in subjects with 25(OH)D levels<20 ng/ml was as: 33.2% had 0–1 symptom, 33.6% had 2–3 symptoms, 33.2% had 4–5 symptoms, p=0.006; similar distribution differences were observed between albumin level groups).

Table 1: Characteristics of the study subjects (n=623)

Age		42 (34-51)
Gender, (M/F)		69/554 (11.1/88.9%)
BMI (kg/m^2)		34.6 (30.9-40.1)
PBF (%)	Men	37.3 (31.8-41.3)
	Women	46.5 (42.2-50.8)
WHR	Men	0.98 (0.96-1.01)
	Women	1.00 (0.97-1.03)
BMR (kcal/day)	Men	1732 (1654-1944)
	Women	1405 (1309-1498)
Education level	Unschooled	14 (2.3)
	Primary school	269 (43.2)
	Secondary school	50 (8.0)
	High school	125 (20.1)
	University/master	165 (26.5)
Marital status	Single	97 (15.6)
	Married	481 (77.2)
	Widow	45 (7.2)
Income*	Extremely low (1)	120 (19.3)
	Low (2)	269 (43.2)
	Medium (3)	131 (21.0)
	High (4)	33 (5.3)
Smoking	Current smoker	53 (8.5)
	Ex-smoker	132 (21.2)
	Never smoked	438 (70.3)
Alcohol	Yes	39 (6.3)
	No	584 (93.7)
Perception of general well-being	Extremely poor (1)	36 (5.8)
	Poor (2)	229 (36.7)
	Fair (3)	269 (43.2)
	Good (4)	84 (13.5)
	Excellent (5)	5 (0.8)
Met-S (+)	Yes	302 (48.5)
	No	321 (51.5)

*70 of the subjects refused to answer the income question.
**BMI: body-mass index, BMR: basal metabolic rate, PBF: percent of body fat, WHR: waist-to-hip ratio

Table 2: Anthropometric and laboratory comparisons of overweight/obese subjects based on their perceived general well-being

	Feel good (n=89)	Feel fair (n=269)	Feel poor (n=229)	Feel extremely poor (n=36)	p-value
Age (years)	39 (27-49)	44 (34-51)	43 (35-51)	39 (30-48)	.066
BMI (kg/m^2)	32.0 (29.4-37.4)	33.5 (30.5-38.2)	36.6 (32.7-43.0)	37.4 (34.1-42.6)	<.001
PBF (%), Men	38.6 (31.8-44.2)	35.3 (29.9-38.2)	39.0 (31.9-43.0)	38.8 (34.2-40.9)	.511
Women	44.5 (40.6-49.0)	45.6 (41.3-49.9)	48.6 (43.5-51.5)	49.1 (45.1-51.7)	<.001
WHR, Men	0.98 (0.96-1.01)	0.98 (0.95-1.00)	0.98 (0.96-1.00)	0.99 (0.98-1.01)	.562
Women	0.97 (0.94-1.02)	0.99 (0.96-1.03)	1.01 (0.97-1.05)	1.01 (0.99-1.03)	<.001
FPG (mg/dL)	97 (89-104)	98 (91-107)	96 (88-105)	96 (89-106)	.225
Fasting HOMA-IR	3.2 (1.9-4.4)	2.8 (2.0-4.1)	3.0 (2.2-4.3)	3.6 (2.6-4.6)	.436
HbA1C (%)	5.9 (5.5-6.3)	5.8 (5.6-6.2)	6.0 (5.6-6.3)	5.5 (5.3-5.7)	.051
HDL-C (mg/dL)	52 (43-61)	51 (44-60)	50 (42-59)	42 (32-52)	.001
LDL-C (mg/dL)	126 (89-169)	121 (100-151	128 (103-153)	118 (101-147)	.711
TG (mg/dL)	138 (89-169)	122 (86-158)	126 (91-166)	125 (101-205)	.512
TSH (mIU/L)	2.43 (1.5-3.29)	1.94 (1.27-3.47)	1.76 (1.18-3.27)	2.56 (1.56-3.57)	.117
Anti-TPO (IU/mL)	11 (8-35)	13 (8-38)	11 (6-24)	15 (10-65)	.105
Free T4 (ng/dL)	1.17 (0.99-1.25)	1.11 (0.96-1.26)	1.13 (1.08-1.27)	1.26 (1.22-1.33)	.133
Hemoglobin (g/dL)	13.4 (12.6-14.0)	13.1 (12.3-13.8)	13.1 (12.3-13.8)	12.9 (12.1-13.9)	.266
ALT (U/L)	19 (14-31)	19 (15-26)	18 (15-26)	23 (17-38)	.229
AST (U/L)	19 (15-27)	19 (17-23)	19 (16-24)	20 (15-25)	.996
Creatinine (mg/dL)	0.73±0.14	0.70±0.14	0.69±0.12	0.72±0.16	.569
Corrected Ca (mg/dL)	8.5 (8.2-9.0)	8.5 (8.2-8.8)	8.5 (8.2-8.8)	8.5 (8.3-8.9)	.833
Albumin (g/dL)	4.9 (4.5-4.9)	4.7 (4.5-4.8)	4.5 (4.3-4.7)	4.4 (4.6-4.8)	<.001
25(OH)D (ng/mL)	20.2 (12.2-24.9)	12.7 (8.3-17.2)	12.4 (8.4-16.7)	11.2 (7.1-17.3)	<.001
Met-S (+)	39 (43.8)	132 (49.1)	111 (48.5)	20 (55.6)	.905

Figure 3: Distribution of the number of symptoms within groups classified according to a) 25(OH)D level and b) albumin level (the five symptoms are nervousness, sleep disturbances, headache, depressive mood, and lassitude).

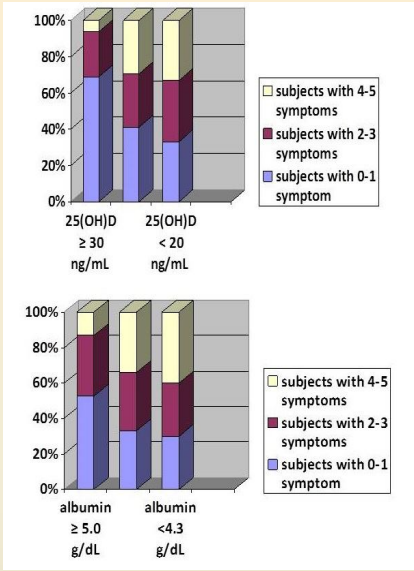


Figure 1: Linear correlations (curve estimation) of albumin, 25-hydroxy vitamin D, HDL-C, and education levels with perceived general well-being in overweight/obese subjects

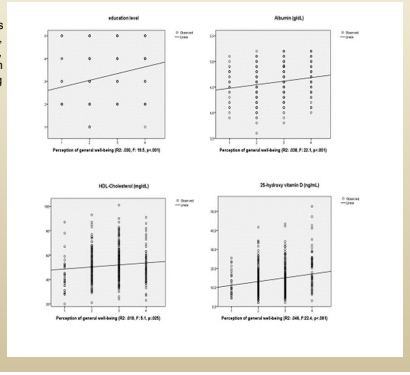
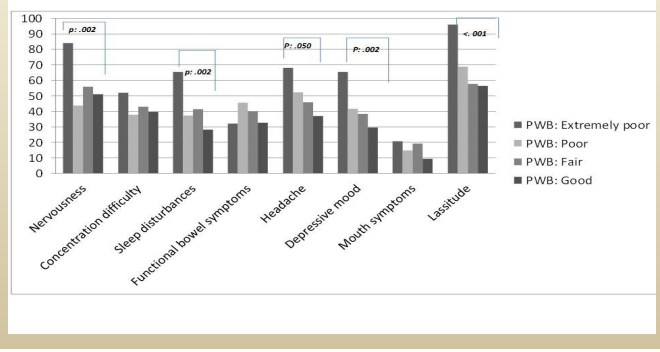


Figure 2: Frequency of symptoms, with a comparison among groups classified by perceived general well-being scores



CONCLUSIONS

25(OH)D and albumin levels correlate with perceived general well-being scores, and the reduction of their circulating levels contributed to an increased risk of symptoms such as nervousness, sleep disturbances, headache, depressive mood, and lassitude in our representative sample of overweight/obese individuals. Moreover, these correlations persist irrespective of the presence of metabolic syndrome, thyroid autoimmunity, and thyroid function. Further longitudinal interventional studies are warranted to document the causal relationships among these public health problems.