Serum cortisol level and depression severity in a sample of Brazilian elders

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Dear Editor,

The recent precision medicine movement has pushed research towards the identification of biomarkers that can be used for early diagnosis. We designed a pilot study that explores the correlation between blood cortisol level (BCL) with depression, depression severity and clinical comorbidities in a sample of aged Brazilian subjects. We hypothesized that BCL will significantly correlate to depression, its severity and with clinical comorbidities in our sample.

Participants were selected from an epidemiological study of older residents of the city of Sao Paulo[1], which screened positive for depression (depression scale-D10-score ≥ 7)[2] and a pool of outpatients who received treatment for depression. Inclusion criteria were 60 years and older, and DSM-IV-TR[3] criteria for major depressive disorder based on a diagnostic interview by geriatric psychiatrists. Controls were 10 adults who were at least 60 years old without depression. Exclusion criteria included dementia, other organic mental disorder, and DSM-IV-TR-criteria-based diagnoses of any psychiatric disorder other than depression. Diagnosis and exclusion criteria were assessed with the CAMDEX interview[4].

We followed 11 depressed subjects. Seven patients (63.6%) began depression after age 60 (late onset depression). Both groups had more female subjects (70% of controls and 54.5% of patients). The groups were similar in terms of marital status, mini-mental score, age and education.

In the initial appointment the subjects were assessed with: Mini Mental State Examination (MMSE)[5]; the CAMCOG version validated for the Brazilian population[6]; Montgomery-Asberg Depression Rating Scale (MADRS)[7], Cumulative Illness Rating Scale (CIRS)[8], Bayer Activities of Daily Living Scale (B-ADL) adapted for the Brazilian population[9], and the Hamilton Rating Scale for Depression (HAM-D)[10]. To ensure that no subjects with incipient dementia would be included in the group we applied MMSE, CAMCOG and the B-ADL. We were unable to standardize the blood sample collection time, but all cases had it collected between 6-10 am (controls 6:29-9:42 am, mean = 8:57:55 am, mdn = 8:57 am; depressed subjects 6:19-9:52 am, mean = 9:23:44 am, mdn = 9:10 am).

It was found that BCL was significantly higher in the depressed aged subjects ($p = 0.049$, $U = 27$, Wilcoxon-Mann-Whitney test), and correlated significantly with severity of both the depressive symptoms (HAM-D: $p < 0.001$, $U = 0$; MADRS: $p < 0.001$, $U = 0$; B-ADL: $p < 0.001$, $U = 10$; Wilcoxon-Mann-Whitney test) and the clinical comorbidities (CIRS-severity, $p = 0.032$, $U = 25$). Finally, depression could be predicted by BCL in a regression model (Table 1).

These findings should be taken with caution, as we did not standardize the collection time for BCL. Nevertheless, they suggest that hypercortisolemic depressed elders comprise a subgroup within depressed subjects. Their clinical course may progress with more morbidity/comorbidities and functional deficits, as shown by the statistically significant relation to all four scales applied. Elevated BCL predicts depression ($p = 0.037$, $df = 1$, $B = 0.34$, $SE = 0.162$, Table 1), which suggests that BCL might be involved in the development of depression in aged patients. The odds of 1.402 means that for each raise of 1 unit (μg/dl) of cortisol level there is 40% increase in risk of depression (95% C.I. 1.020 - 1.926).

Table 1. Logistic regression results for the prediction of diagnostic status from the BCL

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)
BCL	0338	0.162	4.333	1	0.037	1.402	1.020 - 1.926
Constant	-4.155	2.058	4.076	1	0.044	0.016	

BCL: blood cortisol levels; B: the intercept; S.E.: standard error; Wald: Wald chi-square test; df: degrees of freedom; Sig.: significance; Exp(B): odds ratio; C.I.: confidence interval.

Conflict of interest

The authors declare there are no conflicts of interest.

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References

1. Bottino CMC, Azevedo D, Tatsch M, Hototian SR, Moscoso MA, Folquitto J, et al. Estimate of dementia prevalence in a community sample from São Paulo, Brazil. Dement Geriatr Cogn Disord. 2008;26(4):291-9.
2. Barcelos-Ferreira R, Pinto Jr J, Nakano EY, Steffens DDC, Litvoc J, Bottino CMC, et al. Clinically significant depressive symptoms and associated factors in community elderly subjects from Sao Paulo, Brazil. Am J Geriatr Psychiatry. 2009;17(7):582-90.

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3. American Psychiatric Association (APA). Diagnostic and Statistical Manual of Mental Disorders (DSM-IV). 4th ed. Washington DC; 1994.
4. Roth M, Tym E, Mountjoy CQ, Huppert FA, Hendrie H, Verma S, et al. CAMDEX. A standardised instrument for the diagnosis of mental disorder in the elderly with special reference to the early detection of dementia. Br J Psychiatr. 1986;149(6):698-709.
5. Folstein M, Folstein S, McHugh P. Mini-Mental State: a practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res. 1975;12(3):189-98.
6. Bottino CMC, Almeida OP, Tamai S, Scalco M, Carvalho I. Entrevista estruturada para o diagnóstico de transtornos mentais em idosos. CAMDEX. The Cambridge examination for mental disorders of the elderly. Brazilian Version (translated and adapted on behalf of the editors, Cambridge University Press). São Paulo; 1999.
7. Montgomery S, Asberg M. A new depression scale designed to be sensitive to change. Br J Psychiatr. 1979;134:382-9.
8. Linn B, Linn M, Gurel L. Cumulative illness rating scale. J Am Geriatr Soc. 1968;16(5):622-5.
9. Folquitto J, Bustamante S. The Bayer: activities of daily living scale (B-ADL) in the differentiation between mild to moderate dementia and normal aging. Rev Bras Psiquiatr. 2007;29(4):350-3.
10. Hamilton M. A rating scale for depression. J Neurol Neurosurg Psychiatry. 1960;23:56-62.