Scientific
Research
Publishing

Brain CT Findings in First Episode Depression in Older Adults

Ezzat Abdel Azeem A. Awad[1]*, Heba Mahmoud Fakher Hendawy[2], Ahmed Kamil Alawady[3]

[1]Salamat Polyclinic, Hail, Saudi Arabia
[2]Faculty of Medicine, Psychiatry Department, Ain Shams University, Cairo, Egypt
[3]Psychiatry Department, Al-Azhar University, Cairo, Egypt
Email: *drezzat65@hotmail.com

Abstract

Introduction: Different studies reported the strong relationship between cerebrovascular changes (CVC) and depression. Moreover, many researchers tried to correlate between the pathogenesis and location of the CVC and severity of depression. Methods: In this study we looked for the possibility of presence of CVC in patients with an age ranging from 60 - 75 years, presented to psychiatric clinics and hospitals in Hail, Saudi Arabia and diagnosed for the first time with depression. All patients have been diagnosed neither with cerebral attacks (CA) nor with depression. A cross sectional study was done on 149 patients. Hamilton rating scale (HRS) for depression was used to evaluate the severity of depression before staring any treatment. National institutes of health stroke scale (NIHSS) was applied for all the patients to exclude any possibility of CA. Brain CT was done to all patients to detect an evidence of CVC. Results: According to the CT findings, the patients were divided into four groups: Group 1 with normal CT findings; Group 2 with ischemic changes; Group 3 with single lacunar infraction; and Group 4 with multiple lacunar infarctions. After analyzing the results and correlating the severity of depression and CT findings in the four different groups we found significance in the correlation between severity of depression and the presence of minor strokes. Conclusions: A first episode of depression in older adult patients may indicate the presence of minor or silent stroke or CA.

Keywords

---

*Corresponding author.

1. Introduction

For many years researchers tried to explore the relation between cerebro-vascular changes (CVC) and depression. Different studies reported the strong relationship between the two. Theories were proposed to explain this relationship, especially in elder population [1]. Some researchers concluded that depression was a psychological reaction to the clinical consequences of stroke [2]. Depressive symptoms could be a reaction to certain patterns of cognitive and functional impairment resulting from CVC, and depend on the size of the lesion [3]. Other studies suggested that post stroke depression (PSD) was determined by chronic accumulation of both macrovascular and microvascualr lesions [4], or disturbance of certain circuits and neurotransmitters in the brain [5]. On the other hand, a recent prospective longitudinal study highlighted depression as a risk factor for stroke in middle aged women [6]. Accumulating data from several studies and meta-analyses demonstrated this controversial relationship between depression and CVC [1] [5] [7]. Hence, many studies are still needed in order to identify the most likely causal relation, pathogenesis and further clinical implications. We tried in this study to detect the possibility of presence of CVC in older adults diagnosed for the first time with depression.

2. Methodology

A cross sectional study was done on 149 older adults reviewed in Hail mental health hospital outpatient clinics and private psychiatric clinic in Hail over six months who accepted investigations and allowed use of the results in research. Patients included were ≥60 years old and presented with first episode of depression. Patients with past or recent history of cerebral attacks (CA) were excluded.

Hamilton rating scale for depression (HAM-D), 17-item version: was used to evaluate the severity of depression before starting any treatment. National institutes of health stroke scale (NIHSS), was applied for all the patients on first presentation to exclude any possibility of neurological deficit due to CA. Moreover, brain CT was done to all patients to detect any evidence of CVC. The data was analyzed using SPSS-17. One way ANOVA with post Hoc test (Bonferroni) was used to compare mean scores of HAM-D in different groups. P value ≤ 0.05 was considered significant.

3. Results

149 candidates participated in the study, 42 females (28.2%) and 107 males (71.8%). Their age was ranging from 60 to 77 years old; mean = 66.32 years.

HAM-D scores were found to be ranging from 15 - 28, mean ± standard deviation (M ± SD) = 20.45 ± 2.722. Moderate depression represented 15.4% of the sample's results (23 patients), severe depression 59.1% (88 patients) and very severe depression 25.5% (38 patients). The candidates were then divided into four groups according to brain CT findings depending on presence of CVC. We found that 50 patients had normal CT (33.6% of sample), 31 patients had single infarction (20.8% of sample), 29 patients had multiple infarctions (19.5% of sample), and 39 patients had ischemic changes only (26.2% of sample).

The CVC were distributed on the right side in 18 patients (12.1%), left side in 19 patients (12.8%), and bilaterally in 62 patients (41.6%). Lesions were found to be sub-cortical in 21 patients (14.1%), cortical in 28 patients (18.8%), and cortical-sub-cortical in 50 patients (33.6%).

HAM-D score means were compared among cases with single (M ± SD = 19.97 ± 1.871), multiple infarctions (23.10 ± 2.76), ischemic changes only (20.38 ± 2.48) and normal Brain CT (19.26 ± 2.32). A statistically significant difference was found (P = 0.001), with Post Hoc test Bonferroni, the group with multiple infarctions was significantly statistically different from the other groups; P = 0.001 (**Figure 1**).

The sample was divided according to the site of infarction to normal (19.26 ± 2.319), cortical (20.89 ± 2.23), sub-cortical (19.33 ± 1.85), and cortical-sub-cortical (21.86 ± 2.96) groups. One way ANOVA showed statistically significant difference among the groups regarding the means of HAM-D scores; P = 0.001. The main difference as detected by Post Hoc Bonferroni method it was found to be between cortical-sub-cortical group and the normal group; P = 0.001 and the sub-cortical group; P = 0.001. Besides, between Cortical and normal groups; P = 0.036 (**Figure 2**).

Regarding the side of CVC, one way ANOVA showed statistically significant difference in HAM-D scores among groups; P = 0.001. Post Hoc test (Bonferroni) was done and the only difference was found to be between bilateral CVC (21.32 ± 2.89) and normal group (19.26 ± 2.32); P = 0.001 (**Figure 3**). No statistically significant
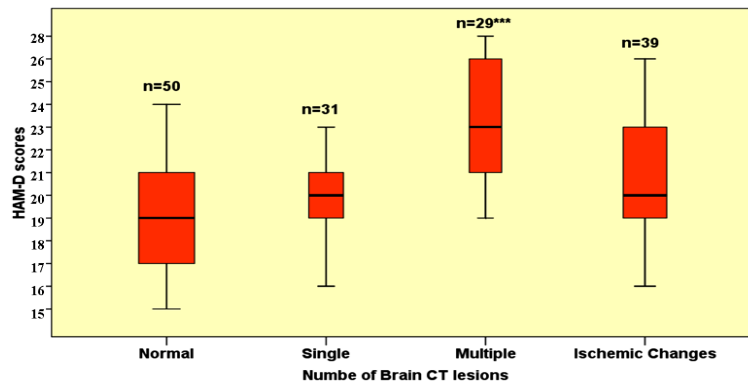
Figure 1. HAM-D score in relation to the number of Brain CT lesions. Where n = number of cases in each group, the range of scores, means and statistically significant difference as calculated by post Hoc test; Bonferroni (P = 0.001[***]).
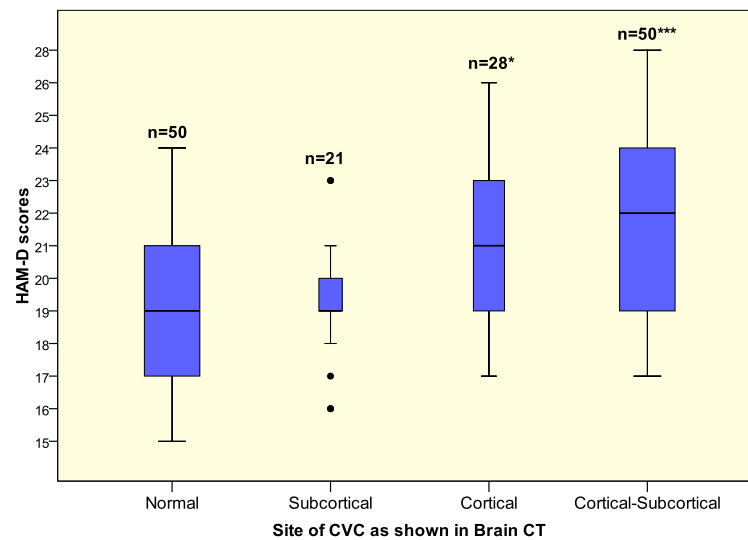

Figure 2. HAM-D score in relation to the site of CVC in Brain CT. Where n = number of cases in each group, the range of scores, means and statistically significant difference as calculated by post Hoc test; Bonferroni (P = 0.001[***], P = 0.036[*]).

deference was found in HAM-D scores between right (20.39 ± 2.36) and left side (20.79 ± 2.46) changes; P = 0.64. Also, no significant difference was found between left and bilateral groups; P = 0.435.

4. Discussion

As shown in results, the patients with multiple CVC showed the highest scores in HAM-D. That would agree with previous research which suggested that depression would be a consequence of cumulative CVC rather than single lesion [4]. It was also found that the cortical-sub-cortical groups of lesions were associated with highest HAM-D scores which indicate the role of combined lesions in depressive symptoms compared to the white matter or sub-cortical lesions. These results could add to the controversial results of previous studies which found sub cortical lesions to be a higher risk for depression [5]. Regarding the side of lesion, we found no significant difference between right and left hemispheres, these results correspond to the results of the meta-analysis by Carson [8] who found no relation between the side of lesion and severity of depression. The difference between bilateral brain lesions and other groups could be related to the multiplicity and accumulation of CVC [4] rather than its side. The presence of CVC in 66.4% of our sample would raise the question whether depression is an
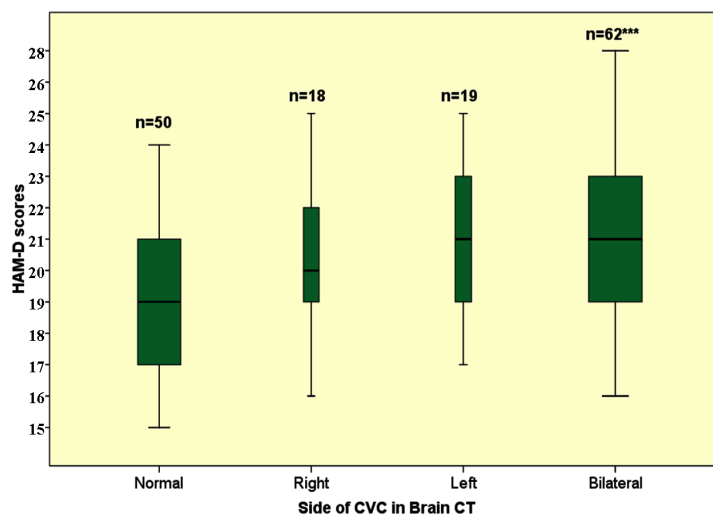
Figure 3. HAM-D score in relation to the site of CVC in Brain CT. Where n = number of cases in each group, the range of scores, means and statistically significant difference as calculated by post Hoc test; Bonferroni (P = 0.001^{***}).

early presentation of CVC in older adults and the importance of brain imaging in this population as a routine investigation.

5. Conclusion

A first episode of depression in older adult patients may indicate the presence of minor or silent stroke or CA.

Acknowledgements

References

[1]   Xekardaki, A., Santos, M., Hof, P., Kovari, E., Bouras, C. and Giannakopoulos, P. (2012) Neuropathological Substrates and Structural Changes in Late-Life Depression: The Impact of Vascular Burden. *Acta Neuropathologica*, **124**, 453-464. http://dx.doi.org/10.1007/s00401-012-1021-5

[2]   House, A., Dennis, M., Mogridge, L., Warlow, C., Hawton, K. and Jones, L. (1991) Mood Disorders in the Year after First Stroke. *British Journal of Psychiatry*, **158**, 83-92. http://dx.doi.org/10.1192/bjp.158.1.83

[3]   Nys, G.M., van Zandvoort, M.J., van der Worp, H.B., de Haan, E.H., de Kort, P.L. and Kappelle, L.J. (2005) Early Depressive Symptoms after Stroke: Neuropsychological Correlates and Lesion Characteristics. *Journal of the Neurological Sciences*, **228**, 27-33. http://dx.doi.org/10.1016/j.jns.2004.09.031

[4]   Santos, M., Kovari, E., Gold, G., Bozikas, V.P., Hof, P.R., Bouras, C. and Giannakopoulos, P. (2009) The Neuroanatomical Model of Post-Stroke Depression: Towards a Change of Focus? *Journal of the Neurological Sciences*, **283**, 158-162. http://dx.doi.org/10.1016/j.jns.2009.02.334

[5]   Gothe, F., Enache, D., Wahlund, L.O., Winblad, B., Crisby, M., Lokk, J. and Aarsland, D. (2012) Cerebrovascular Diseases and Depression: Epidemiology, Mechanisms and Treatment. *Panminerva Medica*, **54**, 161-170.

[6]   Jackson, C.A. and Mishra, G.D. (2013) Depression and Risk of Stroke in Midaged Women: A Prospective Longitudinal Study. *Stroke*, **44**, 1555-1560. http://dx.doi.org/10.1161/STROKEAHA.113.001147

[7]   Patten, S.B. (2012) Review: Depression Is Associated with an Increased Risk of Stroke in Adults. *Evidence-Based Mental Health*, **15**, 6. http://dx.doi.org/10.1136/ebmental-2011-100331

[8]   Carson, A.J., MacHale, S., Allen, K., Lawrie, S.M., Dennis, M., House, A. and Sharpe, M. (2000) Depression after Stroke and Lesion Location: A Systematic Review. *Lancet*, **356**, 122-126.
http://dx.doi.org/10.1016/S0140-6736(00)02448-X