

UTILITY OF THE CLOCK DRAWING TEST AS COGNITIVE SCREENING IN PATIENTS WITH ARTERIAL HYPERTENSION

(Heart and Brain Study in Argentina)

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FEDERACION
ARGENTINA de
CARDIOLOGIA

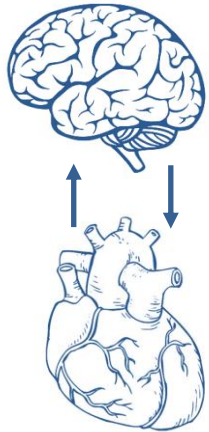


ICBA Instituto Cardiovascular
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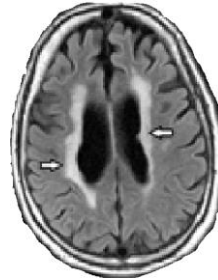
Background

1 HEART and BRAIN CONNECTION

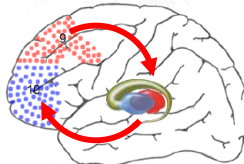


+700 papers support relationship between HTN & Cognition

2 VASCULAR BRAIN INJURY



WML (White Matter Lesion)
Disconnection
the pre-frontal cortex



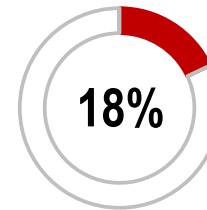
Executive Dysfunction
20%-25% conversion to dementia

3 EPIDEMIOLOGICAL STUDIES in ARGENTINA

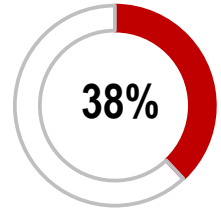
5 Epidemiological studies
+3000 hypertensive patients

Cognitive impairment

Global Cognitive
Impairment
(MMSE)



Executive
Dysfunction
(CDT)



The Background of this study.

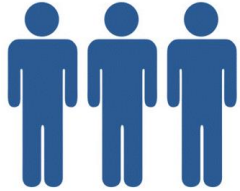
- ① The heart and brain connection is a fact. In the last 40 years more than 700 papers have supported the relationship between HTN and cognition.
- ② HTN is the main cause of vascular brain injury affecting the subcortical white matter (WM) and, depending of the **“burden” and "progression"** of the WMLs increases the risk for stroke but much more for cognitive impairment (CI). Because, WMLs cut the connection between the subcortical structure and the pre-frontal cortex affecting the executive functions (typically cognitive domain affected in hypertensive patients) such as planning, visuospatial ability, working memory and decision-making. Detecting executive dysfunction is very important, because 20% to 25% of the patients they will convert to dementia within the next years.
- ③ Five epidemiological studies in Argentina carried out by our group with more than 3000 hypertensive patients concluded that the average prevalence of executive dysfunction (using CDT) is twice of the average prevalence of global cognitive impairment (using MMSE).

Then, due to all these, it is imperative detect CI and especially executive dysfunction in HTN patients.

Purpose/Design/Methods

To compare the utility of two cognitive test and to know the prevalence of the cognitive impairment in hypertensive patients.

POPULATION



533 Men

882 Women (62%)

Mean age **60** years

Education level **10** yrs.

Average BP **144/84** mm Hg

LOCATIONS

18 Hospitals

in Argentina

(Heart & Brain study)




TWO INTERVENTIONS

1 Mini-Mental Test

Screening Tool: The Mini-Mental State Examination (MMSE)

Patient _____ Examiner _____ Date _____

Maximum	Score	Orientation
5		• What is the (year) (season) (date) (day) (month)?
5		• Where are we (state) (country) (town) (hospital) (floor)?
3		Registration • Name 3 objects: 1 second to say each. Then ask the patient all 3 after you have said them. Give 1 point for each correct answer. Then repeat until he/she learns all 3. Count trials and record. Trials _____
5		Attention and Calculation • Serial 7s: 1 point for each correct answer. Stop after 5 answers. Alternatively spell "world" backward.
3		Recall • Ask for the 3 objects repeated above. Give 1 point for each correct answer.
2		Language • Name a pencil and watch.
1		• Repeat the following "No ifs, ands or buts."
3		• Follow a 3-stage command: "Take a paper in your hand, fold it in half and put it on the floor."
1		• Read and obey the following CLOSE YOUR EYES.
1		• Write a sentence.
1		• Copy the design shown. 

_____ **Total Score** _____
ASSESS level of consciousness along a continuum _____
Alert Drowsy Stupor Coma

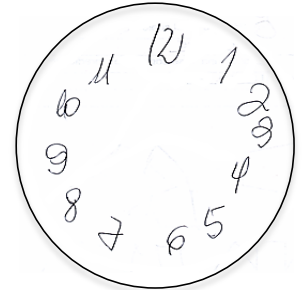
"Mini-Mental State": A Practical Method for Grading the Cognitive State of Patients for the Clinician. Journal of Psychiatric Research, 12:10-18, 1975. Used with permission.

[more information on reverse](#)

2 Clock Drawing Test

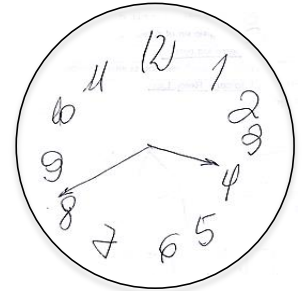
FIRST ORDER

To write the number inside the circle in order and correct position



SECOND ORDER

Draw the hands on the clock indicating the time "twenty to four"



MMSE 19 questions + 1 drawing

PURPOSE

The purpose of this investigation was to compare two cognitive tests for detecting CI in hypertensive patients.

POPULATION/LOCATION

The **Heart and Brain study** was done in **Argentina** by 18 cardiology centres. Included 1414 hypertensive patients (62% were women, the mean age was 60 years old, the education level was 10 years and the average value of the BP was 144/84 mm Hg.

INTERVENTIONS

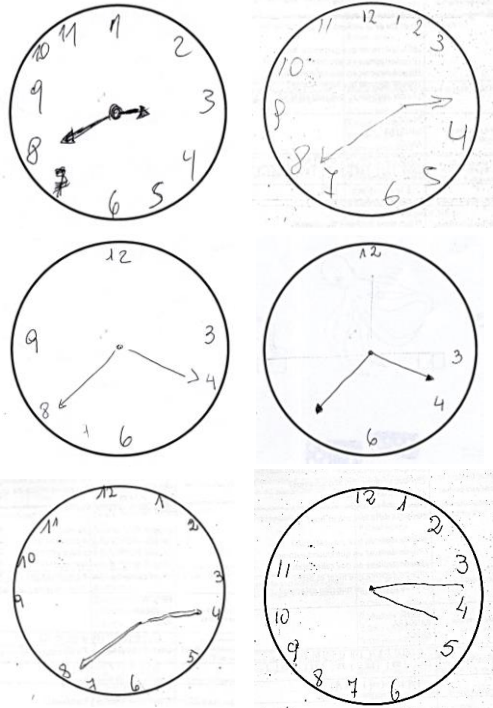
We applied two tests.

1) Mini-Mental Statement Examination (MMSE) explore the global cognition. It has 19 questions and one drawing but lacks of proof for detecting executive dysfunction and demands 20 minutes to do it.

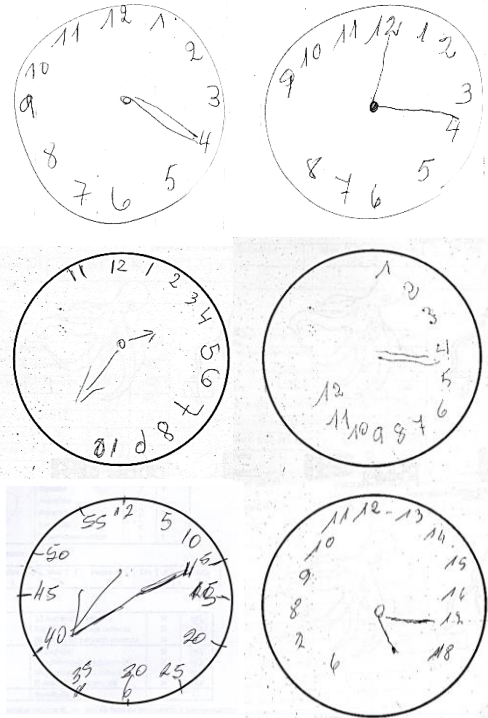
2) Clock Drawing Test (CDT). We give the participants a piece of paper with a 10 cm diameter circle on it. And then we give two orders: First, write the number inside the circle in order and correct position and after the patients must draw the hands on the clock indicating the time “twenty to four”.

Clock Drawing test/Abnormal results (examples)

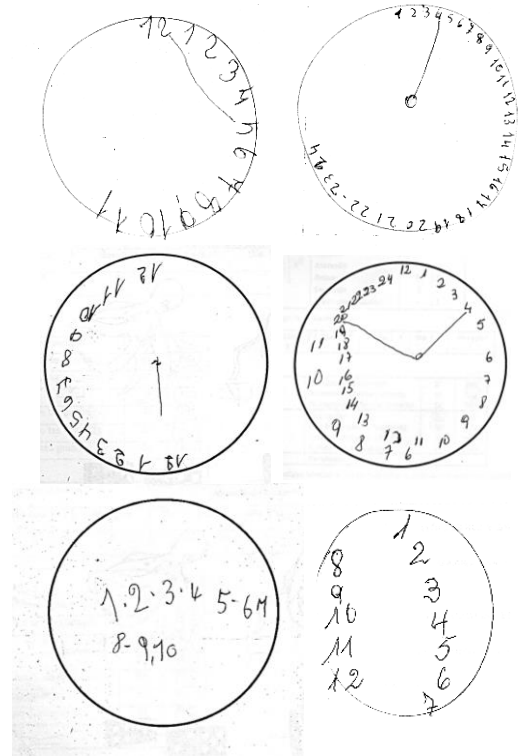
Mild



Moderate



Severe



CDT ABNORMAL RESULTS (Examples).

In this slide, you can see different examples according to severity of CI executive dysfunctions.

LEFT PANEL

The impairment is mild. Compromise in the **spatial organization** or **planification** (the numbers and the center of the hand are not in the correct position) or **missing numbers**.

MIDDLE PANEL

This is more advanced stage. The **time setting** is compromised.

RIGHT PANEL

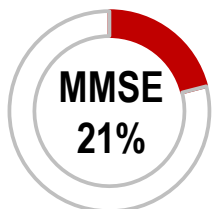
Here, you can see horizontal or vertical alignments of the numbers, inability to draw the hands or more numbers than twelve.

Findings/Results

1414 hypertensive pts.

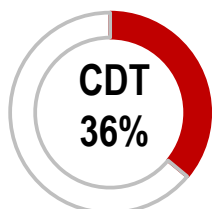


Cognitive impairment



20% 21%

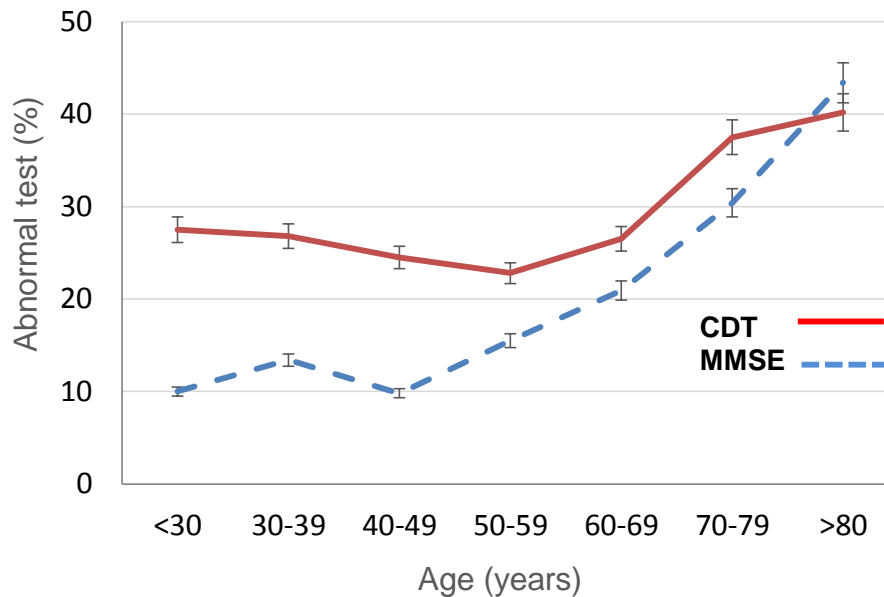
(p ns)



31% 38%

(p 0.01)

CDT vs MMSE in hypertensive patients



RESULTS or FINDINGS

On 1414 hypertensive patients the prevalence of the cognitive impairment using the MMSE was **21%** (without difference between sexes (20% vs 21% p ns) but when we used the CDT was **36%** moreover, in this cases the women presented more executive dysfunction than men and this results had statistical significance (38% VS 31% P 0.01).

FIGURE

You can see as the CDT detect cognitive impairment in **25% more than the MMSE** in adults and young-adults. But, the difference in the results decrease over time. Possibly due to a greater impairment in other cognitive domains in late-life then, in this case the MMSE can be useful to detect the impairment in other domains.

Conclusions

- The prevalence of the cognitive impairment using the **Clock Drawing Test** was higher (**36%**) compared to the **Mini-Mental Test (21%)**.
- Even, the **30% of the hypertensive patients** with normal Mini-Mental Test had abnormal Clock Drawing Test result.
- This disparity in the results between two test was greatest in **middle aged**.
- In addition, this cognitive impairment was more frequent in **women than men (38% vs 31%)**.

Key messages

- ① HTN is the cause of vascular damage in the brain and the most important consequence beyond the stroke is cognitive impairment. So much that, HTN was recognized by Alzheimer Disease International as the main modifiable vascular risk factor for dementia.
- ② One third of the hypertensive patients suffer cognitive impairment, and the most affected cognitive domain are the executive functions (depend of the integrity of the pre-frontal connection).
- ③ The clock drawing test detects the executive dysfunction. This is a simple, quick and easy screening test to be applied in the routine clinical practice.

Thank you for your attention



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