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Review Article

A Review Paper of Addenbrooke's Cognitive Examination (ACE-III)

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Abstract

The Cognitive Test III (ACE-III) is the test that is most frequently used to assess cognitive impairment. The Indian Illiterate Addenbrooke's Cognitive Examination-III (ACE-III) was systematically adapted by modifying the original items of the literate Addenbrooke's Cognitive Examination-III (ACE-III). This study aimed to assess the psychometric properties of Addenbrooke's Cognitive Test III (ACE-III) in large samples of older adults, due to the use of this approach. The Addenbrooke's Cognitive Examination (ACE-III) is designed to assess five core cognitive domains - attention, memory, fluency, language and visuospatial skills- the ACE-III is comprehensive as well as time-efficient, making it suitable for clinical, research, and community settings. This review study reveals that the development, structure, psychometric properties and cross-cultural adaptations of the ACE-III, highlighting its unity in diverse populations. Particular emphasis is placed is on its effectiveness in low-resource and linguistically varied environments, where traditional tools may fall short. The paper also discusses the challenges related to literacy, educational background, and normative data, underscoring the need for localized adaptations and validation studies. Overall, the ACE-III stands as a promising tool in the global effort towards early and accurate cognitive assessment, with significant implications for public health and dementia care strategies.

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1. INTRODUCTION

The Addenbrooke's Cognitive Examination III (ACE-III) is a neurological test is used to assess cognitive functioning of the person often for diagnosing conditions like Alzheimer's disease or other forms of Dementia. It's a revised version of the Addenbrooke's Cognitive Examination and is widely used in clinical settings and the community. The ACE III includes takes that test memory, attention, language, visuospatial, and executive functions. It's often used by healthcare professionals to evaluate cognitive function comprehensively. The total score is out of 100, with different subsections contributing to this score.

Domains of Addenbrooke's Cognitive Examination III (ACE-III)

Attention and Orientation: In this domain, assess basic cognitive functions such as time, place, and surroundings.

Memory: In this domain, we find the short-term memory and long-term memory.

Verbal Fluency: In this we can asks for some words and sentences like naming words and lines to assess verbal abilities.
Language: Evaluate comprehension, repetition and writing abilities.
Visuospatial Abilities: In this test visual processing, spatial orientation and object recognition.
There are some different tasks in literate and illiterate tests of Addenbrooke's Cognitive Examination III (ACE-III).
Scoring: The Addenbrooke's Cognitive Examination III (ACE-III) has a total score of 100 points, with each domain contributing to the overall score:
Attention & Orientation: 18 Points
Memory: 26 Points
Fluency: 14 Points
Language: 26 Points
Visuospatial Abilities: 16 Points
A lower score of participants indicates a more significant cognitive impairment
Purpose: For the early detection of cognitive decline.
Can track cognitive changes over time.
Aids in the differential diagnosis of Dementia types.
Administration Time
The Addenbrooke's Cognitive Examination III (ACE-III) typically takes around 20-30 minutes to complete and is administered by a healthcare professional trained in Addenbrooke's Cognitive Examination III (ACE-III) assessments.

2. METHODOLOGY

The Addenbrooke's Cognitive Examination III (ACE-III) is a paper pen/pencil assessment of participants. In this assessment verbal, non-verbal and performance ability test. In this test researcher finds the attention, memory, fluency, language and visuospatial ability of the the participant. This test is based on these specific domains and helpful for assessing cognitive decline or delay. In this review paper rese, researchers the sum of papers based on the Addenbrooke's Cognitive Examination III (ACE-III) to helpful for the intervention of cognitive decline of ageing population.

3. OBJECTIVES OF THE STUDY:

- To study the structure and components of the Addenbrooke's Cognitive Examination III (ACE-III).
- To assess the effectiveness of the Indian version of Addenbrooke's Cognitive Examination III (ACE-III)

4. REVIEW OF LITERATURE

With reference of the study of "Carlos Calderon", "Christian Beyle", "Oscar Veliz-Gracia" and "Juan Bekios-Calfa" "Psychometric properties of Addenbrooke's Cognitive Examination III (ACE-III): An item theory response- This study attempted to evaluate the Psychometric properties of the Addenbrooke's Cognitive Examination III (ACE-III) test from an IRT (Item response theory) framework. The results are presented in three sections. First, the result of goodness of fit to data to a one-factor model allows us to check the assumptions of IRT models. Second, the results of the estimation of parameters for the IRT models, together with the goodness of fit indices of the items and the global fit indices of the subscales. Additionally a revised version for each sub scale is presented which have been obtained by selecting the items that presented an adequate fit to the IRT model. This study was approved by the scientific ethics committee of the Universidad Catolica del Norte under the resolution 004/2018. Informed consent was obtained in writing form from all the participants.
A cross sectional study was conducted with 1164peoples from the age of 60upwards. Writing and reading were evaluated. There are 288(26.2%) men and 810 (73.8%) women. The mean age was 71.8 years and (SD =7.9) and mean years of schooling was 10.9(corresponding approximately to complete secondary education). 63 participants had a prior diagnosis of Alzheimer dementia, confirmed in secondary specialty care that was periodically registered in their history.
On the review of the study of Bidisha Bhattacharyya, Avanthi Paplikar and others the study of Illiterate Addenbrooke's Cognitive Examination-III in three Indian languages, Bengali, Kannada and Hindi. This study focused on adapting the ACE-III for assessing the cognitive impairment in non-English speaking populations in India. This study involved creating and validating an Indian language version of ACE-III for accurate dementia diagnosis. This adaptation aimed to enhance accessibility and diagnostic accuracy for individuals from diverse linguistic backgrounds, improving sensitivity and specificity in detecting dementia across different cultures. The study found high diagnostic accuracy for dementia showing ACE-III's efficacy as a tool tailored for linguistic diversity in clinical settings. The adapted ACE-III was validated through clinical studies showing a high diagnostic accuracy for dementia and MCI. It includes assessments across five cognitive domains: attention, memory, fluency, language & visuospatial abilities, with scoring adjustments reflecting the cultural context. The research underscores the importance of cultural sensitive diagnostic tools in improving dementia diagnosis and support for population. The impact of this work is significant, as it offers clinicians a reliable tool to screen for cognitive impairment across various Indian communities, aiding in early diagnosis and intervention efforts in dementia care.
On the basis of review of study of Swati Bajpai, Ashish Upadhyay & others, hindi version of Addenbrooke's Cognitive examination III, in Indian older adults, comparing its validity with the Hindi Mini-Mental State Examination to assess cognitive performance and differentiate between mild and major Neurocognitive disorders. This study involves 412 older adults from a memory clinic was conducted, categorized into healthy controls, MCI and MNCD groups, and analyzed using Hindi ACE-III and HMSE. Hindi ACE-III has good discriminating power at lower cut-offs than standard scores for detecting Mild Cognitive Impairment (MCI) and MNCD, with slightly higher AUC values compared to HMSE.
Murugan, V, *et al*. (2021) [4] this study focused on adapting and validation of Addenbrooke's cognitive examination (ACE-III). This version is used only Tamil speaking population in South

India. This version is according to culture appropriate of South Indian Tamil population. In this version performance were analyzed to determine the tool's reliability and validity in distinguishing between cognitive states. On the basis of performance of Tamil population assessment, the Tamil version is valid tool for the assessing cognitive functions among Tamil Speaking peoples. Its implementation can aid in the early detection and management of cognitive impairments.

Chowdhury, A., *et al*. (2020) [5], this study aimed to adapt and validate the ACE-III for Hindi speaking populations in India, addressing the need for culture appropriate assessment tool. In this study total 412 participants were enrolled, they are older participants. They were divided into three categories. Normal, Mild cognitive impairment and participant with major cognitive issues. On the basis of assessment Hindi Version of ACE-III is valid and reliable for detecting the cognitive impairment of Hindi speaking peoples. It is more helpful for early detection of cognitive impairment.

CONCLUSION

The ACE-III is a very helpful for cognitive screening with multiple domains. On the basis of these reviewed studies the ACE-III is reliable and validated tool for assessment of participants for research purpose and hospital settings also. This tool is available in regional languages also and it is more helpful of assessing the cognitive issues. Because Early diagnosis is important for the population of every country. ACE-III is culture appropriate test so it is more helpful for the fid out the cognitive decline comparative to other tools. On the basis of research objectives Indian version of ACE-III is more effective and helpful.

Discussion on the basis of the review studies of the Tamil and Hindi versions of ACE-III have very useful and efficient for the detection of Dementia and Mild Cognitive Impairment (MCI) in Indian populations. Both the studies are very perfectly work after translation and it is used in many different regional languages.

On the comparisons with MMSE, ACE-III provides better findings, because it covers most of the areas of attention, memory, languages and problem solving abilities. There are separate cut offs of Hindi version and other languages on the basis of age and education. However both versions need trained person to administer the ACE-III. This test has suitable for community and clinical setup also. On the basis of this assessment researcher perfectly find out the different type of Dementia cases and Mild cognitive impairment (MCI), for early prevention.

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