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Western Aphasia Battery – Arabic

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Abstract

Aphasia is an acquired language impairment resulting from a focal brain lesion in the absence of other cognitive, motor, or sensory impairments. This language impairment can be present in all language components (phonology, morphology, syntax, semantics, pragmatics), across all modalities (speaking, reading, writing, signing), and in the output (expression) and input (comprehension) modes. Since almost a century ago, clinicians have evaluated people with aphasia using Aphasia test batteries. The Western Aphasia Battery (Kertesz, 1982) provides the diagnostic goals of classifying aphasia subtypes and rating the severity of aphasic impairment. When dealing with the issue of the increasing number of aphasics in various regions of the world speaking their own native language and the standardised assessment tool being available only in English, the variables impacting the outcome expand. This not only affects the diagnostic scenario but also reveals a major flaw in the method of service delivery. The Western Aphasia Battery (WAB), developed by Shewan and Kertesz in 1982, is one of the most often utilized complete test batteries to determine the type, degree, and severity of aphasia and to categorize aphasia subtypes. As of now, WAB has been developed and translated into several languages, there are currently no standardized measures available for assessing the rising number of Arabic-speaking individuals who are stricken by aphasia in communities around the world. The objective of this study is to develop and standardize the Arabic version of the Western Aphasia Battery (WAB-A).

Introduction

Aphasia is an acquired language impairment resulting from a focal brain lesion in the absence of other cognitive, motor, or sensory impairments. This language impairment can be present in all language components (phonology, morphology, syntax, semantics, pragmatics), across all modalities (speaking, reading, writing, signing), and in the output (expression) and input (comprehension) modes. From a neurolinguistic perspective, aphasia is a breakdown in specific language domains resulting from a focal lesion (Lesser, 1987).

What is critical to an adequate definition is the mention of four primary facts: it is neurogenic; it is acquired; it affects language; and it excludes general sensory and mental deficits.

Aphasia is neurogenic. Aphasia always results from some form of damage to the brain. The specific structures affected vary among cases, as do the means by which the damage may occur. Still, the underlying cause of aphasia is always neurologic. Aphasia is most often caused by stroke, but may also arise from head trauma, surgical removal of brain tissue, growth of brain tumours, or infections.

Aphasia is acquired. Aphasia is not characterized as a developmental disorder; an individual is not born with it. Rather, it is characterized by the partial or complete loss of language function in a person who had previously developed some language ability. It is important to note that most people with aphasia retain many linguistic abilities; many experience problems of reduced efficiency of formulation and/or production, reduced access to linguistic information still stored in the brain, and reduced retention of new linguistic information, not necessarily a complete lack of ability in any given area of language processing in life.

Aphasia involves language problems. Aphasia is often described as symbolic processing disorders, a multimodal problem of formulation and interpretation of linguistic symbols. In defining aphasia, it is important to recognize that any or all modalities of symbolic communication may be affected: speaking, listening, reading, writing, and receptive and expressive use of sign language. Most cases involve at least some impairment in all language modalities.

Aphasia is not a problem of sensation, motor function, or intellect. Aphasia excludes general sensory and mental deficits. By definition, aphasia does not involve a problem of sight, touch, smell, hearing, or taste. Although aphasia may be accompanied by any number of other deficits in perceptual acuity, its definition excludes such deficits. Further, aphasia is not a result of general intellectual deterioration, mental slowing, or psychiatric disturbance. Aphasia is also not due to motor impairment. The exclusionary characteristics of the definition of aphasia are especially critical in the differential diagnosis of a wide array of neurogenic language, speech, cognitive, motor, and perceptual disorders.

The aspects of language impaired depends on the site of the lesion on the brain. Modalities that may be affected (in various combinations) are:

- Expressive Language (putting thoughts into words)
- Receptive Language
- Word Retrieval
- Reading

- Writing
- Swallowing problems

The level of frustration exhibited by a person with aphasia will vary depending on how aware they are of their deficit. According to the National Aphasia Association, more than 100,000 Americans acquire some form of aphasia each year.

Researchers have shown a great deal of interest in categorising aphasia based on its wide range of symptoms, leading to the existence of many classification systems that, from the early 19th century to the present, represent diverse concepts reflecting a difference in perspective. However, the classification scheme of Goodglass and Kaplan (1972) is currently used (Sarno, 2002; McNeil & Copland;2011). Goodglass and Kaplan (1972) provided the following major categorization for evaluating people with aphasia, including pure word deafness, Wernicke's aphasia, anomic aphasia, global aphasia, conduction aphasia, transcortical sensory aphasia, and mixed nonfluent aphasia.

Since almost a century ago, clinicians have evaluated people with aphasia using Aphasia test batteries. Between 1960 and 1982, as interest in aphasia rehabilitation increased and objective assessments of the effects of treatment were necessary, numerous test batteries that are used globally today were established (Byng, Kay, Edmundson, & Scott ,1990). Among them are the Boston Diagnostic Aphasia Examination (BDAE; Goodglass & Kaplan, 1983), the Porch Index of Communicative Ability (PICA; Porch, 1981), the Minnesota Test for Differential Diagnosis of Aphasia (MTDDA; Schuell, 1972), and the Western Aphasia Battery (WAB; Kertesz, 1982). The Western Aphasia Battery (Kertesz, 1982) provides the diagnostic goals of classifying aphasia subtypes and rating the severity of aphasic impairment. The test has been used in taxonomic classification studies (Kertesz, 1976; Kertesz & Phipps, 1977, 1980) and in the description of recovery from aphasia (Lomas & Kertesz, 1978). The test presents itself as a comprehensive aphasia battery which provides highly structured observations to arrive at a diagnosis.

Even among normal people, language skills might vary depending on factors including gender, age, education level, and other factors. For instance, it has been documented that literacy has an impact on cognitive processes, including language (Manly, Jacobs, Sano, Bell, Merchant, Small & Stern, 1999). Age also has a significant influence on language abilities such as vocabulary diversity, sentence complexity, subordinating conjunctions, and possibly sentence length (Bromley, 1991). In light of the fact that aphasia is an acquired language problem, careful consideration during linguistic assessment is essential from a diagnostics perspective. The results of the tests also are influenced by a variety of various circumstances. When dealing with the issue of the increasing number of aphasics in various regions of the world speaking their own native language and the standardised assessment tool being available only in English, the variables impacting the outcome expand. This not only affects the diagnostic scenario but also reveals a major flaw in the method of service delivery.

The Western Aphasia Battery (WAB), developed by Shewan and Kertesz in 1982, is one of the most often utilized complete test batteries to determine the type, degree, and severity of aphasia and to categorize aphasia subtypes. The WAB is intended to evaluate clinical language function in aphasic individuals and to offer the information required to determine a treatment outlook. The WAB is made to assess linguistic and nonlinguistic abilities. Content, fluency, auditory comprehension, repetition, reading, writing, calculation, and naming are all examples of linguistic skills. Drawing, block designing, and practice are examples of nonlinguistic skills. The scoring system offers the following general severity measures: The oral portion of the language assessment is used to calculate the Aphasia Quotient (AQ), which includes Spontaneous Speech (S), Auditory Verbal Comprehension (C), Repetition (R), and Naming (N), and the Cortical Quotient (CQ), which includes Nonverbal scores on reading, writing, apraxia, and constructional tasks, produces the Performance Quotient (PQ). The WAB has been translated into several languages, including Japanese (WAB Aphasia Test Construction Committee, 1986), Hebrew (Kasher, Batori, Soroker, Graves, & Zaidel, 1999), Korean (Kim & Na, 2004). A few Indian languages have their own versions of the WAB that have been modified, such as the test of aphasia in Malayalam (Jenny, 1992), the Telugu version of the Western Aphasia Battery (Pallavi, 2010), the Kannada version of the WAB (Chengappa & Kumar, 2008), the Bangla version of the Western Aphasia Battery (Keshree, Kumar, Basu, Chakrabarty & Kishore, 2013), and Western Aphasia Battery in Nepali (Shah, Karna & Verma, 2020).

The epidemiology and associated risk factors of stroke is high in the Middle Eastern countries. This could be due to higher level of stress due to various factors such as changes in lifestyle, especially in younger population, or exposure to prolonged political turbulence. Such factors could lead to an increase in the prevalence of non-communicable diseases such as stroke. While more studies are still required to understand the effects of each of the factors in contributing to a high number of stroke cases in the Middle East, from a therapeutic point of view, early and accurate diagnosis of aphasia assumes critical significance in providing effective care for stroke patients.

As of now, WAB has been developed and translated into several languages, there are currently no standardized measures available for assessing the rising number of Arabic-speaking individuals who are stricken by aphasia in communities around the world. Arabic is a Semitic language that first emerged in the 1st to 4th centuries common era. It is the native language of the Arab world. Arabic, in its Modern Standard Arabic form, is an official language of 26 states and 1 disputed territory, the third most after English and French. Arabic is the liturgical language of more than 2 billion people, and Arabic is one of six official languages of the United Nations. All varieties of Arabic combined are spoken by perhaps as many as 422 million speakers (native and non-native) in the Arab world, making it the fifth most spoken language in the world, and the fourth most used language on the internet in terms of users. The objective of this study is to develop and standardize the Arabic version of the Western Aphasia Battery (WAB-A).

Review of Literature

Language is all around us. Our waking life hardly ever have a minute without words, and even in our dreams, we talk and are talked to. Perhaps more than any other characteristic, language is what sets humans apart from other animals. Knowing a language allows you to communicate with others and be understood by them. This indicates that you have the ability to both create sounds that have specific meanings and to comprehend or interpret the sounds made by others.

Aphasia is an acquired selective impairment of language modalities and functions resulting from a focal brain lesion in the language dominant hemisphere that affects the person's communicative and social functioning, quality of life, and the quality of life of his or her relatives and caregivers. (Papathanasiou, Coppens, & Potagas, 2011)

Aphasia is caused by acquired disease processes rather than congenital ones, such as cerebral infarction, tumours, and contusions. The former happens to those who could previously use language effectively.

Aphasia can make it difficult for a patient to understand language that they read, hear, spoken, or both. It may also damage the ability to understand visuomotor signs produced by a sign language. Writing and oral language output can both be impacted by aphasia. It has an impact on the user's capacity to communicate in a linguistically appropriate way. Aphasia often disturbs both reception and expression of language, in both visual (written) & auditory (spoken) modes.

Aphasics have trouble comprehending verbal messages, that is, understanding their meaning as opposed to hearing or seeing those messages. A person who is deaf or blind cannot understand language when processed through their perceptual impairment mode, but they can understand the same verbal communication normally when processed through an intact sensory modality, such as tactile Braille reading in the case of blindness. Aphasics also struggle with verbal message formulation, such as choosing the lexical and syntactic components required to transmit meaning and placing them in a relational framework to ensure that the recipient of the message really receives that meaning.

Language Deviations in Aphasia

- Agrammatism
- Paragrammatism
- Phonetic deviations
- Phonological (literal) paraphasias
- Verbal paraphasias
- Semantic paraphasias
- Syntagmatic paraphasias

- Circumlocutions
- Neologism
- Jargon
- Impaired repetition ability
- Word finding difficulty

Causes of Aphasia

1) **Traumatic Brain Injury (TBI)** happens when the brain is damaged by an abrupt trauma. Males typically have a 50% larger chance of sustaining a TBI than females do, across all age groups and everywhere. Depending on whether the skull was cracked as a result of the head trauma, TBIs are typically categorised as open or closed-head injuries. In closed head injury (CHI), the head suddenly hits an object, or an object hits the head, without breaking through the skull. CHIs are sometimes referred to as acceleration-deceleration injuries. This is because the head is in motion and is suddenly stopped on contact (e.g., when a passenger's head hits the windshield during a car accidents) or the object is in motion & is suddenly stopped by the head (e.g., when a brick falls from a building and lands on a person's head). An open head injury (OHI) involves breakage or penetration of the skull. Examples are falls that lead to skull fracture, gunshot wounds to the head, & lacerations by sharp objects, such as a knife, or axe.

2) **Cerebrovascular Accidents (CVA)** are caused by blood clots & broken blood vessels in the brain. Symptoms include dizziness, numbness, weakness on one side of the body, and problems with talking, writing, or understanding language. The risk of cerebrovascular accident is increased by high blood pressure, older age, smoking, diabetes, high cholesterol, heart disease, atherosclerosis (a build-up of fatty material and plaque inside the coronary arteries), & a family history of cerebrovascular accident. It is the medical term for a stroke. There are two main types of cerebrovascular accident, or stroke: an **ischemic stroke** is caused by a blockage; a **hemorrhagic stroke** is caused by the rupture of a blood vessel. Both types of strokes deprive part of the brain of blood and oxygen, causing brain cells to die.

The Signs of Aphasia

Naming Disturbances and the Production of Paraphasias

The ability to choose a word from the verbal lexicon that accurately expresses a concept is at the heart of language formation. Even though we may consciously search for the exact lexical item, a process known as word finding, the selection process is frequently automated. When word choice is unsuccessful, the desired thing is either left out or a wrong and unintended word is substituted. The latter is known as paraphasia and is most likely the primary aphasia indicator. It is referred to as verbal or global paraphasia if a whole word is substituted. It is known as a semantic paraphasia if the improperly chosen item falls under the same semantic field (for example, choosing a chair instead of a table). Jargon speech develops when verbal paraphasias occur too frequently and repeatedly in sentences. Words that are completely new

& not included in the dictionary of a given language can be considered as paraphasias (Neologistic paraphasias). The mechanism for the formulation of the new word may be a succession of phoneme substitutions. A single phoneme replacement or addition, such as when table becomes trable or fable, is referred to as a Phonemic or Literal paraphasia. When reading aloud or repeating spoken words, performing naming activities, or writing, paraphasias can occur; however, they are typically not present in automatic speech (emotional exclamations, series of numbers, calendar sequences).

Disturbance of Fluency

It might be difficult to categorise the overall qualities of speech in aphasic patients, although they frequently fall into one of two categories: Fluent or Nonfluent. Fluent speech is close to normal speech in terms of the rate at which words are produced, the length of each sentence, the melodic contour of the sentences, & the general ease of the speaking act. In practical terms, it is usually measured by the longest continuous string of words that the patient produces in conversation. Fluent aphasic speech may be actually more abundant than normal speech. Nonfluent speech is the opposite: the rate is low, sentence length is short, the melodic contour is lost, the production is effortful, & there may be more pauses than actual words in a given time unit. Although some patients may have slight issues, most people with fluent speech have normal articulation. Although some do not, many patients with nonfluent speech also have flawless articulation. A fluency measurement can help with clinical classification & give an approximate idea of where the lesion is located. The posterior side of the perisylvian area is where lesions are most commonly found in patients with fluent aphasias. The anterior aspect of the perisylvian area is where lesions are most commonly found in patients with nonfluent aphasias (Benson, 1967).

Disturbances of Repetition

Another sign of aphasia is the inability to repeat words or sentences. Repetition skills may be completely lost, impaired by phonemic paraphasias, or missing sounds and words. Most aphasias affect repetition, which really predominates the clinical presentation of conduction aphasia in large part due to the absence of other obvious deficits. The lesion is clearly located in the perisylvian region of the dominant hemisphere due to its existence. In the transcortical aphasias and the so-called anomic aphasias, whose corresponding lesion is located outside the perisylvian ring, repetition faults are noticeably missing. Transcortical aphasia patients may actually repeat too well, mimicking the examiner's statements as soon as they are spoken, frequently with little to no understanding of what they are parroting. Such a defect is called echolalia.

Disturbances of Auditory Comprehension

Auditory comprehension can be impaired to variable degrees. Some patients are able to take part in a casual conversation, responding appropriately in words or by nodding, pointing, making facial expressions, or using gestures to show that they understand the messages being sent. Yet, confronted with laboratory tests, they may fail many items, especially when the question aims at specifics rather than generalities, & when the linguistic structure is complex rather than transparent. Other patients may be quite impaired even in a simple conversation, let alone in the laboratory tests.

Disturbance of Grammatical Processing

Agrammatism is another important sign of aphasia. It refers to difficulty with generating the syntactic frames into which lexical selections must be placed, and to a defective utilization of grammatical morphemes. It was previously believed that only Broca type patients were agrammatic, but it is now known that individuals with other aphasia types, including the frequently occurring Wernicke's aphasia, can also be agrammatic.

Disturbance of Reading and Writing

Although the two defects don't always go together, reading comprehension & auditory comprehension can both be affected in similar ways. For instance, people with auditory comprehension defects typically have some reading difficulty, but the percentage of patients with both impairments is low. On the other hand, a reading disability might manifest in its purest form without affecting writing or aural comprehension. However, reading, writing, & auditory comprehension are typically all affected simultaneously by aphasia, although rarely to the same degree.

Apraxia

Many aphasic individuals also exhibit apraxia, which can be seen as yet another symptom of aphasia from a practical and clinical perspective. Apraxia may be defined as a disorder of the execution of learned movement that cannot be accounted for by weakness, incoordination, sensory loss, or impaired comprehension or attention to commands. It is important to check for apraxia in all aphasic patients since it can make it difficult for them to carry out verbally ordered actions.

Classification of Aphasia

Language disorders have been classified in several different ways, often based on different theoretical frameworks. The most typical classification is the so called neoassociationist classification, which is based on the anatomic disconnection model (Geschwind, 1967). According to this model, a lesion in a specific brain area result in a more or less well-defined aphasic syndrome.

Broca's Aphasia

In Broca's aphasia, speech is effortful, nonfluent, consisting of short phrases or single words. However, the clinical picture can range from a total loss of speech to a minor deficiency that is only marked by problems with word finding. For instance, in telegraphic speech (also known as agrammatism), all short, function words (such as prepositions) are absent, and the patient primarily uses nouns & verbs to communicate. This pattern may also extend to written language. Automated verbal sequences, such as reciting the days of the week or counting, &

occasionally cursing or emotional speech, are usually preserved. Comprehension is relatively spared. However, a careful investigation reveals distinct deficiencies in understanding complicated syntactic structures. Reading aloud, writing, naming, & repetition of words or sentences are also impaired. Sometimes, phonemic paraphasias are seen. In addition to right hemiplegia of varying degrees, people with Broca's aphasia generally experience ideomotor apraxia (Benson, 1993), apraxia of speech (Basso, 2003), and apraxia of speech. Broca's aphasia is classically associated with a lesion in the posterior part of the inferior frontal gyrus, the insula, & the frontal operculum (the most posterior portion of the inferior frontal gyrus [i.e., of Broca's area] is part of the operculum). Premotor & prefrontal areas of the cortex, subcortical regions, and parts of the basal ganglia may also be affected.

Wernicke's Aphasia

Wernicke's aphasia is described as a condition that is almost the opposite of normal language comprehension & verbal communication. The extent of comprehension problems may vary among patients & moderate comprehension deficits are not uncommon (Basso, 2003). Verbal output is fluent, & it is characterized by the presence of phonemic and semantic paraphasias, neologisms, & empty speech, while rich content words are reduced in frequency. When severe, this condition is called jargon aphasia. Because the persons with aphasia are unable to monitor their own verbal output because of the comprehension deficit, such patients are often unaware of their language disorder (anosognosia) and this further affects communication difficulties & often hinders rehabilitation. Repetition, naming, reading aloud, & writing are impaired. Ideomotor apraxia and hemianopia (Basso, 2003) or superior right quadrantanopia (Adams, Victor, & Ropper, 1997) are common in Wernicke's aphasia, while motor disorders are rare. Wernicke's aphasia is usually associated with lesions of the posterior left perisylvian region, localized in particular at the posterior part of the superior temporal region traditionally referred to as Wernicke's area, and occasionally extending to the adjacent parietal and temporal areas.

Conduction Aphasia

The speech of conduction aphasics is fluent although usually less abundant than that of Wernicke's. Commonly there are minor defects in aural comprehension, although understanding of everyday conversation is intact. The impairment in repetition of words & sentences is commonly seen. The defect takes many forms. Most commonly, patients repeat words with phonemic paraphasias, but often they will omit or substitute words. Comprehension of the defectively repeated sentences is good. Deficits in naming & writing are common. Reading aloud is impaired & contains semantic & phonemic paralexias. Similarly, patients comprehend the sentences that they read aloud with numerous paraphasias. Conduction aphasics often have some accompanying motor signs (paresis of the right side of the face and of the right upper extremity), but recovery is good. The lesion associated with this aphasic syndrome is typically located in the left temporal-parietal junction. However, it has been proposed that conduction aphasia is the result of a more extensive lesion including other structures, such as the insula, the primary auditory cortex, & the supramarginal gyrus (Damasio, 1998).

Transcortical Sensory Aphasia (TSA)

In transcortical sensory aphasia, speech is fluent but, in many cases, meaningless or unintelligible (i.e., jargon), with many paraphasias & neologisms. Comprehension of oral & written language, naming, reading, & writing are severely impaired, while the most prominent characteristic is again the preserved ability of the patient to repeat words & sentences. Echolalia is present in some cases. This type of aphasia is associated with lesions posterior to the perisylvian region, in the parietaloccipital region (Adams, Vargha Khadem, Carr, Issacs, Brett & Mishkin 1997).

Transcortical Motor Aphasia (TMA)

Patients with transcortical motor aphasia (TMA) have intact repetition. They can have echolalia as well. But the speech is nonfluent, troubled by phonemic & global paraphasias, perseveration, & loss of connective words. Auditory comprehension is also impaired when tested formally, although patients can often carry on a simple conversation at bedside. Reading aloud and writing are impaired. There is a striking preservation of the repetition capacity. Overall, the lesions that cause it to have been found in various sites: in the frontal region anterior or superior to Broca's area (Benson, 1993), at the supplementary motor area, or at the cingulate gyrus (Cummings & Mega, 2003). In some cases, the lesion is subcortical, affecting white matter beneath the frontal lobe (Damasio & Geschwind, 1984)

Global Aphasia

Global aphasia includes severe deficits in all aspects of language. Speech is not fluent & often limited to stereotypic utterances. However, overlearned, automatized sequences (reciting the days of the week, for example) are sometimes preserved. Comprehension, naming, repetition, reading, & writing are severely impaired (Alexander, 2000). Such a condition is the result of a lesion covering a large portion of the perisylvian area, often caused by total occlusion of the left middle cerebral artery, therefore causing severe motor and sensory deficits involving the right half of the body & occasionally visual field defects, as well as oral, ideomotor, and ideational apraxias (Cummings & Mega, 2003).

Anomic Aphasia

Anomic aphasia is often referred to as amnestic, amnesic, or nominal aphasia. Anomia refers to the patient's inability to find names of people or objects. The patient, although aware of the nature of an object, is unable to name it upon request. Verbal output is fluent, characterized by word-finding difficulties, frequent pauses, & circumlocutions, while phonemic & semantic paraphasias are rare. Repetition, comprehension, & reading aloud are spared. Anomic aphasia may be associated with lesions affecting posterior language areas, including the angular gyrus (in the parietal lobe, near the superior edge of the temporal lobe) or the middle temporal gyrus. However, it is frequently observed as the outcome of many recovered aphasics. Moreover, several brain regions are involved in confrontation naming, depending on the type and modality of the stimulus. Thus, anomic aphasia is considered to have little or no localization value (Basso, 2003).

Assessment of Aphasia

Purposes of assessment & testing assessment procedures vary greatly, depending on the examiner's goal. When assessing & selecting particular instruments, it is crucial to keep the aim in mind. A flexible & educated approach to assessment and testing is necessary to match the assessment technique to the patient. Screening, diagnostic assessment, descriptive testing for rehabilitation & counselling, & progress evaluation are the four main categories of evaluation purposes that can be identified.

Assessment procedure would help to propagate the management goals, monitor the progress in the intervention. The assessment protocols are the predictors of the prognosis. There are several extensive test batteries that include almost all the speech & language aspects, such as Boston Diagnostic Aphasia Examination (BDAE), the Western Aphasia Battery (WAB), the Multilingual Aphasia Examination (MAE), the Minnesota Test for Differential Diagnosis of Aphasia (MTDDA) etc. Tests mainly includes six domains namely, spontaneous speech, auditory verbal comprehension, repetition, naming, reading and writing.

The Western Aphasia Battery (WAB) (Kertesz, 1979, 1982) is a close relative of the BDAE and shares with it the diagnostic goal of classifying aphasia subtypes & rating the severity of the aphasic impairment. Four linguistic and three performance domains make up the test. The pattern of performance on the four language subtests, which rate name, repetition, comprehension, & spontaneous speech, is used to categorise syndromes. The Aphasia Quotient (AQ), which is based on weighted performance on various language subtests, provides an overall assessment of the severity of aphasia. A second summary measure, the Performance Quotient (PQ), is produced from the three performance categories of reading and writing, praxis, construction, & the Raven's Coloured Progressive Matrices. Finally, the Cortical Quotient (CQ) is calculated by adding the AQ & the PQ. Based on the results of the language subtest performed by 375 aphasic patients with varied etiologies and 162 healthy people, criteria for the classification of eight classic aphasic syndromes were described.

WAB might require at least two 2-hr sessions to complete. The main subtypes obtained with the WAB are Global, Broca's, Wernicke's, Conduction, Anomic, Transcortical motor, Transcortical sensory and Isolation aphasia’s (Shewan & Kertesz, 1980). In summary, the primary purpose of the WAB, is diagnostic: the classification of aphasic performances into traditional aphasic syndrome subtypes.

Table 2.1
Shows the Interpretation of WAB test material

Aphasia type	Fluency	Auditory verbal Comprehension	Repetition	Naming and Word finding
Global	<5	0-3.9	0-4.9	<7
Broca’s	<5	4-10	0-7.9	<9
Isolation	<5	0-3.9	5-10	<7
Transcortical motor	<5	4-10	8-10	<9
Wernicke ‘s	>4	0-6.9	0-7.9	<10
Transcortical sensory	>4	0-6.9	8-10	
Conduction	>4	7-10	0-6.9	
Anomic	>4	7-10	7-10	

Western Studies

Shewan and Kertesz (2002) studied on reliability and validity characteristics of the western aphasia battery (WAB). The findings indicated that the WAB is standardised on a sizable representative sample of aphasics & covers all severity levels and all forms of aphasia. The WAB has strong internal consistency and temporal stability reliability qualities.

Bakheit, Carrington, Griffiths and Searle (2009) explored the correlation between an impairment level and a functional level assessment scale of aphasia in Sixty-seven aphasic acute stroke patients who were undergoing conventional speech & language therapy (SLT). The Western Aphasia Battery (WAB) was used to evaluate language impairment, & the Communicative Effectiveness Index (CETI) was used to evaluate the communicative functional limitation brought on by aphasia. For each evaluation period, there was a statistically significant link between the two measures. According to the study, the WAB and CETI scores can be inferred from one another in the acute & subacute stages of stroke.

Dekhtyar, Braun, Billot, Foo, and Kiran's (2020) examined the validity of administering the Western Aphasia Battery via videoconference (WAB). Twenty adults with chronic aphasia completed the assessment both in person & via videoconference with the order counterbalanced across administrations. Specific adjustments were made to a few WAB subtests to allow for computer and Internet engagement. Results showed that there was no difference in the domain scores between the two administration methods, which were closely associated. According to these results, administering the WAB in person or by videoconference may be equally effective for this patient population.

Peach, Ellis and Rothermich (2020) examine the individual contributions of the four major components (Spontaneous Speech, Auditory Verbal Comprehension, Repetition, Naming) & the 10 subtests of the Western Aphasia Battery (WAB) to the WAB AQ (Western Aphasia Battery Aphasia Quotient) using relative weight analysis. They concluded that Spontaneous Speech contributes 30%, Auditory Verbal Comprehension 20%, Repetition 25%, & Naming/Word Finding 25% to the Aphasia. Relative weight analysis for the 10 Western Aphasia Battery subtests revealed the major contributors to be Fluency (14.4%), Repetition (14.1%), Information Content (13.1%), and Object Naming (10.5%).

Rao, Roberts, Schafer, Rademaker, Blaze, Esparza, Salley, Coventry, Weintraub, Mesulam & Rogalski (2022) examined the Reliability of Telepractice Administration of the Western Aphasia Battery–Revised (WAB-R) in persons With Primary Progressive Aphasia (PPA). The WAB-R was given in person and through videoconference to 19 participants with mild to moderate PPA. This led to significant concordance between in-person and telehealth scores for the WAB-AQ (Western Aphasia Battery-Aphasia Quotient), Auditory Verbal Comprehension subtest, & Naming-Word Finding subtest. They concluded that it is important to use caution when comparing these scores across administration types because the Spontaneous Speech test summary score exhibited slightly worse concordance. Given the necessary modifications to the testing technique, these findings justify extending the use of telehealth administration of the WAB-R through videoconferencing to persons with mild to moderate PPA.

Indian Studies

Keshree, Kumar, Basu, Chakrabarty, Kishore & Thomas in 2013 adapted the original WAB in Bengali to give the Bengali WAB (B-WAB), as no formal language assessment tool was available to date and out of all the tools available for aphasia diagnosis, the Western Aphasia Battery (WAB; Kertesz,) has proved to be one of the most comprehensive test batteries for describing the aphasia symptom.

Swati Bajpai and Nehra (2017) studied on the development & standardization of the Indian aphasia battery (IAB) & the results revealed that IAB is a quick and easy to administer measure for assessment of aphasia in Hindi-speaking population with high reliability and validity.

Need of the Study

Prevalence of aphasia is increasing in Arab population, & it has a significant impact on clinical outcomes. It is clear that identifying language problems early on is crucial for optimising the benefits of therapy. The created & standardised tool will aid in the early detection of communication difficulties in people with aphasia brought on by neuropathological diseases as well as the proper implementation of management programmes. However, there are currently no conventional measurements available for assessing the increased number of Arabic speaking individuals who are impacted by aphasia around the world. Arabic language is spoken in a large area including North Africa, most of the Arabian Peninsula, & other parts of the Middle East. Hence the need arises to create & standardise the Arabic version of the WAB (WAB-A).

Aim of the Study

The aim of the present study was to develop & standardize Western Aphasia Battery in Arabic (WAB-A) based on the principles of Western Aphasia Battery (Kertesz, 1982) to assess the language abilities of aphasic patient.

Methodology

Aim

The aim of the present study is to develop and standardize Western Aphasia Battery in Arabic (WAB-A) based on the principles of Western Aphasia Battery (Kertesz, 1982) to assess the language abilities of aphasic patient.

The study consisted of two phases:

1) Translation & Validation
2) Administration

Phase 1:

The Western Aphasia Battery given by (Kertesz in 1982) was adapted and the same was translated and modified by Mr. Muhammed Shafi, an Arabic Tutor at Hayatul Islam College in Aluva, Kochi. The translated material was then given to 5 speech language pathologists who have been working in the Middle East for 5 years. The SLP's rated the translated material for appropriateness using three-point rating scale. i.e., “Most appropriate”, “appropriate with modification” and “not appropriate”. The suggestions and the corrections advised by evaluators were incorporated and the final translated & validated material was ready (Appendix) for the next stage of the testing.

Forty individuals were further grouped in two categories (typical individuals & individuals with aphasia). Group 1 typical individuals were 10 males, 10 females and the age range of 18-60 with the mean age 31. All individuals were native speakers of Arabic language with no history of sensory, speech, language and cognitive impairment which was ensured during the testing.

Group 2 consisted of 20 individuals with aphasia in the age range of 30-75 with the mean age of 57. Table 3.1 following provides information on those who have aphasia. The group 2 patients with aphasia were those who underwent a stroke, and were admitted to the hospital, and received a diagnosis from a neurologist and a speech-language pathologist.

The purpose of the study, procedure and duration of testing was explained to the individuals, or the care giver and prior written consent was taken from the participants or the caregiver for participating in the study. The test was administered in a well illuminated quiet room with minimal obstacles and the individual's responses were documented. Scoring was given for each item.

Table 3.1

Details of the individuals with Aphasia

S. no	Age/Sex	Period post onset	Diagnosis
1	56/M	6 months	Left ACA/MCA Ischemic stroke
2	34/M	10 months	TBI
3	68/M	11 months	TBI
4	31/M	8 months	TBI
5	46/M	1 months	Right MCA Ischemic stroke
6	66/F	8 months	Acute left MCA Ischemic stroke
7	48/M	1 month	Right MCA Ischemic stroke
8	41/M	2 months	TBI
9	35/M	2 months	Ischemic stroke
10	55/M	7 months	TBI
11	48/M	10 months	TBI
12	55/M	1 month	Hemorrhagic stroke
13	50/M	1 month	Hemorrhagic stroke
14	59/M	3 months	Cerebrovascular accident
15	39/F	5 months	TBI

16	60/M	6 months	Ischemic stroke
17	28/F	2 months	Ischemic stroke left frontal lesion
18	71/M	1 month	Temporal thalamic infarct
19	68/M	3 months	Ischemic stroke
20	37/M	2 months	Hemorrhagic stroke

Phase 2:

Administration

The test was initially administered on typical individuals which were considered as normative for the developed test and the test was administered on individuals with aphasia to know the differences in their performances. Depending on the comfort of each person the test was administered in different seating position. Verbal and nonverbal instructions were given to perform each task. Presentation of objects and picture cards were varied with respect to tasks for typical individuals and individuals with aphasia. The seating position which was comfortable for them were considered. Initially, the clinician explained the task to be performed by the individuals. Instructions were repeated only if the participant did not perform any part of test trial correctly. The examiner gave pre-test instructions to the individuals to make sure whether the person has understood the task to be performed. They were instructed in Arabic to answer the questions appropriately and or point to picture cards or objects and to perform actions with objects paced on the table.

Analysis

The statistical analysis showed that the mean and standard deviation for both the groups i.e., typical individuals and the aphasics were tabulated and the performance of both the groups were compared using nonparametric test (Mann Whitney U test) to analyze significant difference across various domains and subsections.

Results and Discussion

The aim of the present study was to develop and standardize Western Aphasia Battery in Arabic (WAB-A) based on the principles of Western Aphasia Battery (Kertesz, 1979) to assess the language abilities of aphasic patient. The analysis of the obtained responses was administered with statistical procedures and the same has been discussed below.

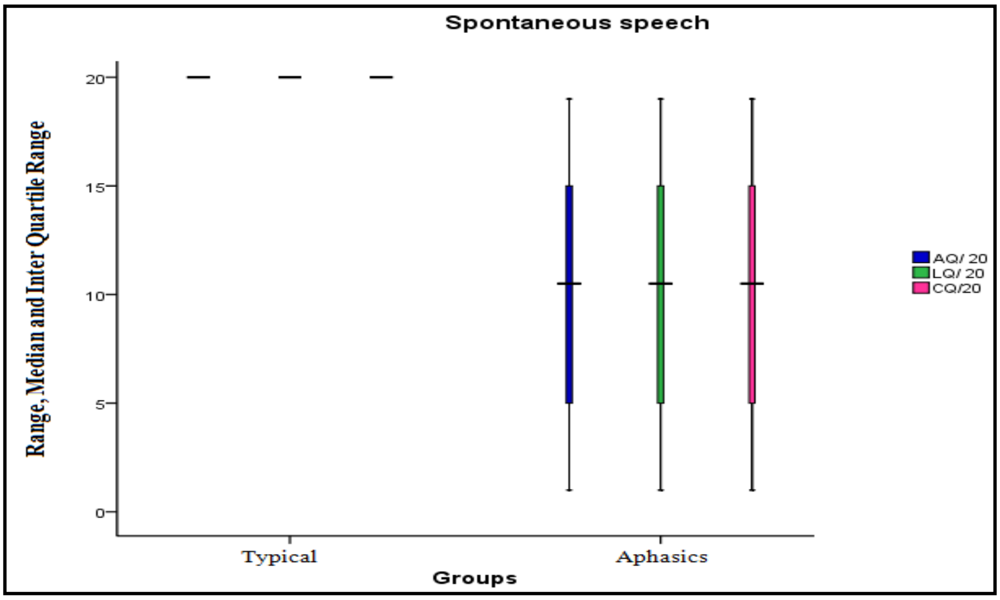
1. Spontaneous Speech

The spontaneous speech section assessed participant's fluency and content. Conversational questions and picture description tasks were used to assess this domain. The measurement of fluency factors such as effort to produce speech phrase length, word finding pauses, hesitations or circumlocutions, rate of speech, any melody and intonation problems were recorded.

Table 4.1
Shows the Mean, Standard deviation (SD) and Significant difference of each group for spontaneous speech tasks

			Mean	S. D	Median	IQR	Mann Whitney "U"	p value
Spontaneous speech	AQ/20	Typical	20	0	20	20 to 20	0	< 0.001*
		Aphasics	9.75	5.61	10.5	4.5 to 15		
	LQ/20	Typical	20	0	20	20 to 20	0	< 0.001*
		Aphasics	9.75	5.61	10.5	4.5 to 15		
	CQ/20	Typical	20	0	20	20 to 20	0	< 0.001*
		Aphasics	9.75	5.61	10.5	4.5 to 15		

Fig.4.1
Shows the performance of both groups for spontaneous speech tasks



AQ= Aphasic Quotient, CQ= Cortical Quotient, LQ= Language Quotient

The content was evaluated for the spontaneous speech. The content parameters like paraphasias (phonemic/literal, neologism, semantic) syntactic or semantic errors, were recorded and the results were obtained for both the sections. From the Table 4.1 and Fig 4.1, it can be inferred that high significant scores were obtained when data was compared between typical and individuals with aphasia. Mann Whitney test was used for the comparison, there was a difference ($p < 0.001$). From the table and figure it's clear that individuals with aphasia performed poorly compared to that of the typical population.

2. Auditory Verbal Comprehension

This domain covers three subtests which are yes/no question, auditory word recognition, and sequential commands.

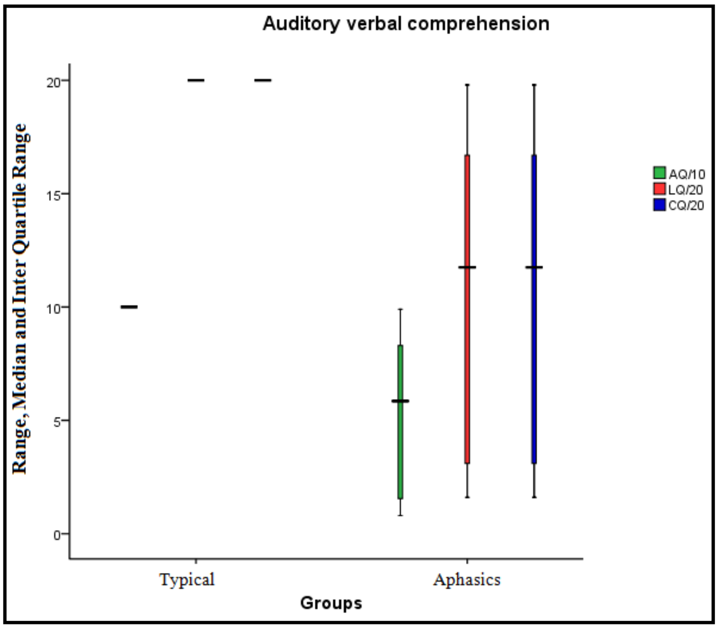
Table 4.2

Shows the Mean, Standard deviation (SD) and Significant difference of each group for Auditory Verbal Comprehension tasks

			Mean	S. D	Median	IQR	Mann Whitney "U"	p value
Auditory verbal comprehension	AQ/10	Typical	10	0	10	10 to 10	0	< 0.001*
		Aphasics	5.30	3.40	5.85	1.53 to8.35		
	LQ/20	Typical	20	0	20	20 to 20	0	< 0.001*
		Aphasics	10.67	6.81	11.75	3.05 to16.8		
	CQ/20	Typical	20	0	20	20 to 20	0	< 0.001*
		Aphasics	10.67	6.81	11.75	3.05 to16.8		

Fig.4.2

Shows the performance of both groups for Auditory Verbal Comprehension tasks



The mean scores for AQ, LQ, and CQ in aphasics were 5.35, 10.67, and 10.67, respectively, whereas the mean scores for normals were 10, 20, and 20. This indicates clearly that individuals with aphasia performed worse than the normal community. It is evident from Fig. 4.2 above that the performance of the typical individuals was significantly superior than that of the aphasic individuals. The results of the statistical analysis revealed that there was a big difference between the two groups.

3. Repetition

In this domain the patient was asked to repeat words, phrases, and sentences of increasing length and complexity. Phonemic substitution, instances of stuttering, repetitions, segmentations, dysprosody and other features of verbal apraxia were noted.

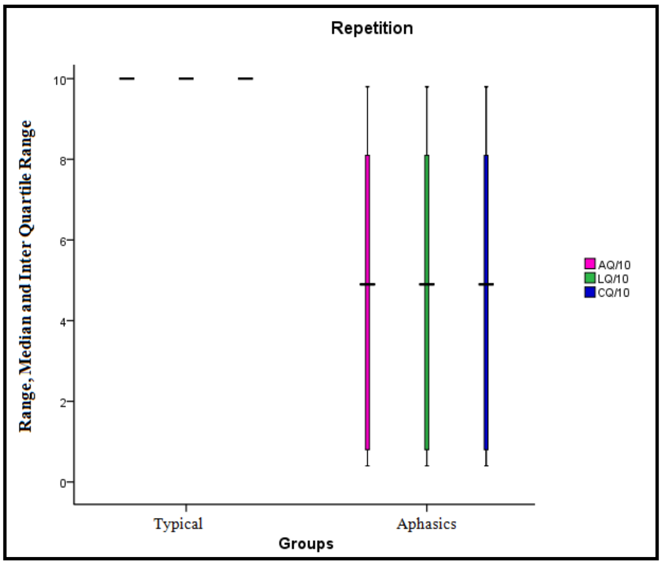
Table 4.3

Shows the Mean, Standard deviation (SD) and Significant difference of each group for Repetition tasks

			Mean	S. D	Median	IQR	Mann Whitney "U"	p value
Repetition	AQ/10	Typical	10	0	10	10 to 10	0	< 0.001*
		Aphasics	4.70	3.55	4.9	0.8 to 8.15		
	LQ/10	Typical	10	0	10	10 to 10	0	< 0.001*
		Aphasics	4.70	3.55	4.9	0.8 to 8.15		
	CQ/10	Typical	10	0	10	10 to 10	0	< 0.001*
		Aphasics	4.70	3.55	4.9	0.8 to 8.15		

Fig.4.3

Shows the performance of both groups for Repetition tasks



In this task, the normal subjects had no trouble understanding, indicating that this population's speech and language traits were clinically normal. The patients with aphasia who had their brain lesions investigated at various sites revealed a great variation, as seen in Table 4.3 and in Fig 4.3. There was a difference ($p < 0.001$) in the scores of repetition tasks between aphasics and typical.

4. Naming and Word Finding

This domain consisted of three subtests, object naming, word fluency, responsive speech, and sentence completion.

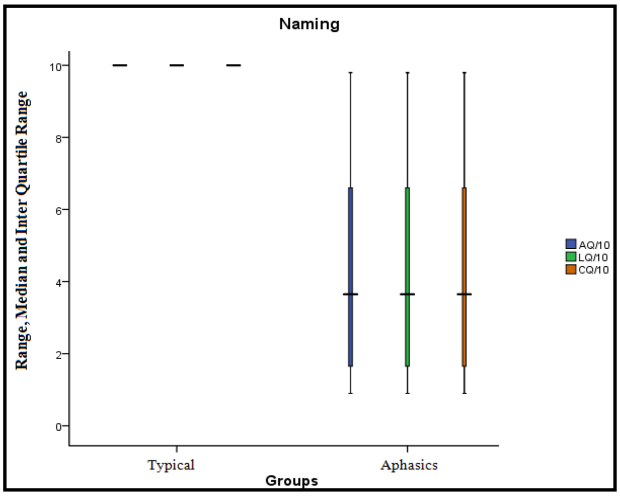
Table 4.4

Shows the Mean, Standard deviation (SD) and Significant difference of each group for Naming and Word finding tasks

			Mean	S. D	Median	IQR	Mann Whitney "U"	p value
Naming and word finding	AQ/10	Typical	10	0	10	10 to 10	0	< 0.001*
		Aphasics	4.32	3.12	3.65	1.48 to 6.9		
	LQ/10	Typical	10	0	10	10 to 10	0	< 0.001*
		Aphasics	4.32	3.12	3.65	1.48 to 6.9		
	CQ/10	Typical	10	0	10	10 to 10	0	< 0.001*
		Aphasics	4.32	3.12	3.65	1.48 to 6.9		

Fig. 4.4

Shows the performance of both groups for naming and word finding tasks



According to the results shown in Table 4.4 when compared to the aphasic population, normal individuals earned high significant scores, and according to Fig. 4.4, the group of people with aphasia performed worser than the average group of people.

5. Reading

Reading task carries different tasks like comprehension of sentences, reading commands, written word- object choice matching, written word-picture choice matching, picture-written word choice matching, spoken word-written word choice matching, letter discrimination, spelled word recognition, and spelling. The response mode for these reading tasks was verbal.

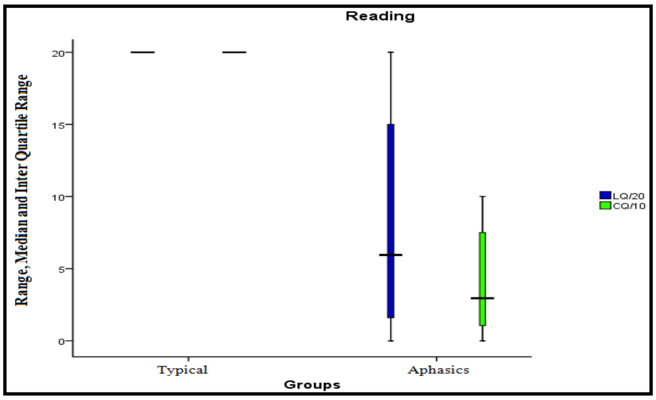
Table 4.5

Shows the Mean, Standard deviation (SD) and Significant difference of each group for Reading tasks

			Mean	S.D	Median	IQR	Mann Whitney "U"	p value
Reading	LQ/20	Typical	20	0	20	20 to 20	10	< 0.001*
		Aphasics	8.18	7.17	5.95	1.6 to 15.3		
	CQ/10	Typical	18	4.10	20	20 to 20	2	< 0.001*
		Aphasics	4.14	3.54	2.95	0.93 to7.65		

Fig. 4.5

Shows the performance of both groups for Reading tasks



In reading tasks, normals had higher mean and median LQ and CQ scores than aphasics. It is evident that those who have aphasia performed worse than the normal group.

6. Writing

There are 7 different tasks evaluated to explore the performance of writing. The tasks were, writing upon request, writing output, writing to dictation, writing dictated words, writing alphabets and numbers, dictated letters and numbers and copying a sentence.

Table 4. 6

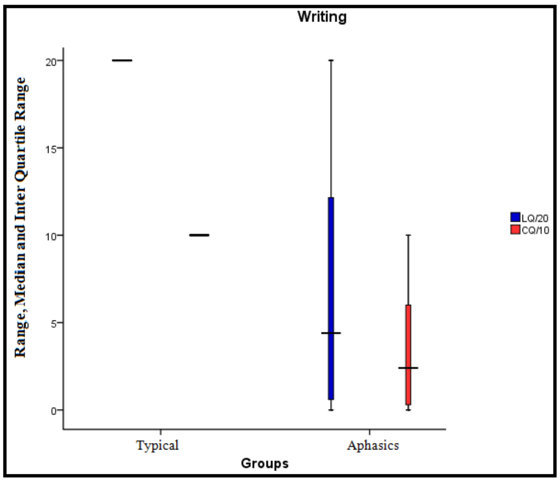
Shows the Mean, Standard deviation (SD) and Significant difference of each group for Writing tasks

			Mean	S. D	Median	IQR	Mann Whitney "U"	p value
Writing	LQ/20	Typical	20	0	20	20 to 20	10	< 0.001*
		Aphasics	6.44	6.67	4.4	0.4 to12.18		
	CQ/10	Typical	10	0	10	10 to 10	10	< 0.001*

		Aphasics	3.32	3.28	2.4	0.2 to 6		

Fig. 4.6

Shows the performance of both groups for Writing tasks



When data between typical and aphasic individuals were compared, scores for the typical population were found to be extremely significant, as shown in Table 4.6. Additionally, it is evident from Fig. 4.6 that the aphasic people underperformed compared to the normal group. According to the Mann Whitney test, there are quite substantial differences between the groups.

7. Apraxia

In this domain the patient was asked to perform certain actions based on the instructions.

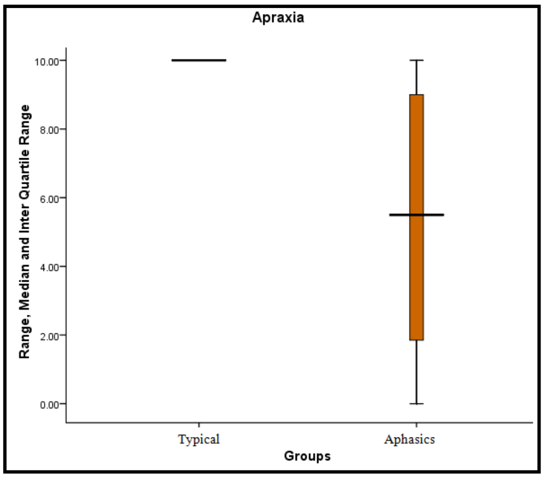
Table 4.7

Shows the Mean, Standard deviation (SD) and Significant difference of each group for Apraxia

			Mean	S. D	Median	IQR	Mann Whitney "U"	p value
Apraxia	CQ/10	Typical	10	0	10	10 to 10	10	< 0.001*
		Aphasics	5.59	3.44	5.5	1.73 to 9		

Fig. 4.7

Shows the performance of both groups for Apraxia



The CQ for apraxia in aphasics is lesser than typical, which clearly says that the individuals with aphasia performed poorly compared to that of the typical group with high significant difference among the groups. The mean and median scores were 5.59 and 5.5, whereas normals scored 10 and 10.

8. Constructional, Visuospatial and Calculation Tasks

In this domain the patient was instructed to draw based on the clinician's command. They were also presented with block designs and calculation tasks.

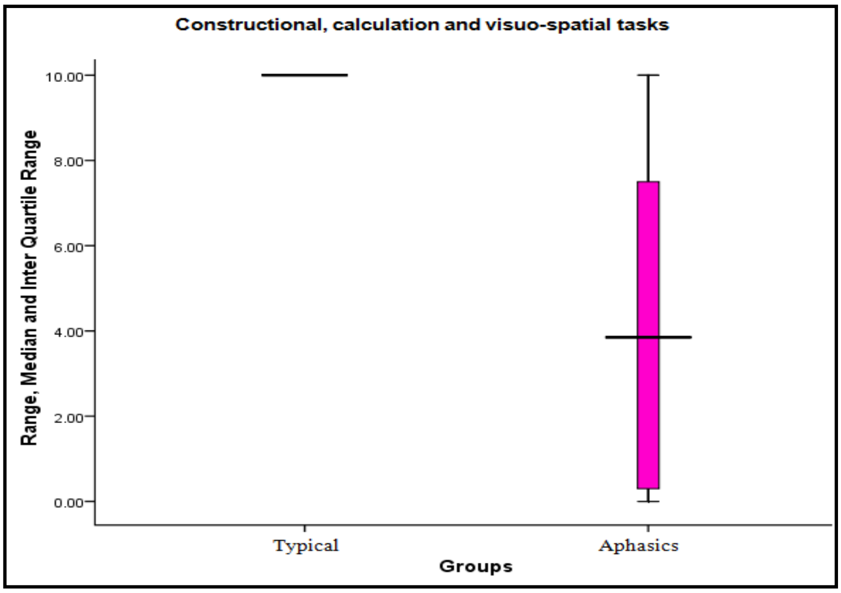
Table 4.8

Shows the Mean, Standard deviation (SD), and Significant difference of each group for Constructional, visuospatial and calculation tasks

			Mean	S. D	Median	IQR	Mann Whitney "U"	p value
Constructural, visuospatial& calculation tasks	CQ/10	Typical	10	0	10	10 to 10	10	< 0.001*
		Aphasics	4.23	3.67	3.85	0.3 to 7.65		

Fig.4.8

Shows the performance of both groups for Constructional, visuospatial and calculation tasks



It is clear from the aforementioned Tables 4.8 as well as Fig. 4.8, that people with aphasia were unable to perform constructional, visuospatial, and calculational tasks. They exhibited difficulty in performing these tasks as compared to normal with scores 4.23.

Discussion

1. Spontaneous Speech

Conversational questions and a description of the image were included in spontaneous speech tasks. The aphasics and the normal people were asked common, straightforward questions in this domain. As shown in the results, the individuals with aphasia could not perform well compared to normal, due to the lesions in their brain, and there was a highly significant difference among the two groups.

2. Auditory Verbal Comprehension

This domain covers the five subtests namely yes/no question, pointing task, auditory word recognition, verification task and sequential command. The auditory verbal comprehension is understanding what one hears through listening. Individuals with aphasia showed poorer response compared to that of the typical group because of the different sites of lesions.

Mansur, Radanovic, Taquemori, Greco and Araujo (2005) analyzed the performance of 162 normal subjects, subdivided into groups according to age and schooling, in the oral comprehension tasks of the Boston Diagnostic Aphasia Examination translated and adapted to Brazilian Portuguese to obtain a profile of performance for the Brazilian population, as well as cut-off scores for each task, and to determine the best combination of tasks that distinguish normal from aphasic subjects, as a guide for clinicians. The normal subjects were compared to 69 aphasics. Age alone influenced the performance in the designation of actions (subjects above 70 years showing the worst performance); schooling alone influenced the comprehension of forms, colours and numbers (subjects with less than four years of education showing a poorer performance). Both age and schooling influenced the performance.

3. Repetition

Repetition has possibly become the most important language feature in aphasia classification. As shown in the results the individuals with aphasia had difficulty in repetition. The possible explanation could be the site of lesions occurring at the areas responsible for the same work (repetition). Broca's, Wernicke's, and conduction aphasias all have a substantial correlation with repetition difficulties, but these deficits vary both quantitatively and qualitatively.

4. Naming

One of the most crucial skills in linguistic processing is naming. It requires the retrieval of synchronised phonological and semantic data from a memory system that may be evaluated in response to a stimulus. When compared to normal people, aphasic populations have less of this capacity.

5. Reading

The reading deficits may occur in oral reading or in comprehension of printed material, and at the single word or text level. The possible cause of reading deficits could be the result of a phonological, lexical, semantic, and /or cognitive impairment. As shown in the results the aphasic individuals exhibited huge difficulty compared to that of the typical group.

6. Writing

Writing is a skill where the other movements of the body is involved like eye gaze, focused visual attention and visual movements etc. When the obtained data was compared between the typical and individuals with aphasia, individuals with aphasia performed poorly compared to that of the typical group.

7. Apraxia

Apraxia is regularly associated with aphasia, but there is controversy whether their co-occurrence is the expression of common basic deficit or results from anatomical proximity of their neural substrates. However, neither aphasia nor apraxia is an indivisible entity.

8. Constructional, Visuospatial and Calculation Tasks

Right focal brain damage (RBD) and left focal brain damage (LBD) shows defective performances on the constructional task with respect to normal subjects. The aphasic population scored lower than typical subjects in judging angle width and mentally assembling abstract geometrical figures. Overall, the results were poor in all the components in Aphasic individuals as compared to that of the typical individuals.

Overall, the results were poor in all components in Aphasic individuals as compared to that of the typical individuals.

Summary and Conclusion

Aphasia is a language impairment caused by brain injury that affects phonological, morphological, lexical, semantic, or syntactic levels of language processing (Code & Petheram, 2011). It is a recently acquired condition of the central nervous system that affects the process of understanding and formulating verbal messages (CNS). Aphasia is caused by acquired disease processes rather than congenital ones, such as cerebral infarction, tumours, and contusions. The former happens to those who could previously use language effectively.

The epidemiology and associated risk factors of stroke is high in the Middle Eastern countries. This could be due to higher level of stress due to various factors such as changes in lifestyle, especially in younger population, or exposure to prolonged political turbulence. Such factors could lead to an increase in the prevalence of non-communicable diseases such as stroke. While more studies are still required to understand the effects of each of the factors in contributing to a high number of stroke cases in the Middle East, from a therapeutic point of view, early and accurate diagnosis of aphasia assumes critical significance in providing effective care for stroke patients.

As of now, WAB has been developed and translated into several languages, there are currently no standardized measures available for assessing the rising number of Arabic-speaking individuals who are stricken by aphasia in communities around the world. Arabic is a Semitic language that first emerged in the 1st to 4th centuries common era. It is the native language of the Arab world. Arabic, in its Modern Standard Arabic form, is an official language of 26 states and 1 disputed territory, the third most after English and French. Arabic is the liturgical language of more than 2 billion people, and Arabic is one of six official languages of the United Nations. All varieties of Arabic combined are spoken by perhaps as many as 422 million speakers (native and non-native) in the Arab world, making it the fifth most spoken language in the world, and the fourth most used language on the internet in terms of users. The objective of this study was to develop and standardize the Arabic version of the Western Aphasia Battery (WAB-A).

The study was carried out in two phases, 1) translation and validation and 2) administration. The Western Aphasia Battery was customized and the same was translated into Arabic language by an Arabic tutor. The translated material was given to 5 speech language therapists who were working in Middle East for the last five years. The test material contains 8 components which are, 1) Spontaneous speech 2) Auditory verbal comprehension 3) Naming 4) Repetition 5) Reading 6) Writing 7) Apraxia 8) Constructional, visuospatial skills.

Administration of the test was depending on the comfort of each person the test was administered in different seating position. Verbal and non-verbal instructions were given to perform each task. Presentation of objects and picture cards were varied with respect to tasks for typical individuals and individuals with aphasia. The seating position which was comfortable for them were considered. Initially, the clinician explained the task to be performed to the individuals. Instructions were repeated only if the participant did not perform any part of test trial correctly. This test was carried out on 20 typical adults and twenty individuals with aphasia. The sensitivity of the test was also done by comparing the typical group with aphasics.

The obtained data were tabulated, and the statistical analysis were also done. For aphasics and the typical group, the scores like mean, standard deviation were calculated separately. Mann Whitney test was used to find the significant difference between the groups and to compare the performance of typical and aphasics.

Results of the study revealed that the individuals with aphasia performed poorly compared to that of the typical group and there was a significant difference seen for all the subtests (Spontaneous speech, auditory verbal comprehension, repetition, naming. reading writing, apraxia and visuospatial skill).

The current study clearly shows that aphasic patients can be identified and classified into the types of aphasia and also the severity of the linguistic and non-linguistic deficits can be obtained in terms of the AQ, LQ and CQ using WAB-A(Western Aphasia Battery-Arabic). The test gives detailed information about oral language abilities which further provides the baseline for therapy plan and recovery. It can be concluded that there is a consistency in performance and the WAB-A is a reliable tool to be used among Arabic population around the world. It is proved beyond doubt that the WAB-A differentiates between normal and aphasic performance. Thus, it can be inferred from this research that the WAB-A can be a useful instrument for assessing aphasic individuals between the ages of 18 and 75.

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