



**COLLEGE OF EDUCATION AND BEHAVIORAL STUDIES
DEPARTMENT OF SPECIAL NEEDS AND INCLUSIVE
EDUCATION**

**THE PREVALENCE OF ACQUIRED NEUROLOGIC SPEECH
AND LANGUAGE DISORDER AMONG ADULT NUROLOGIC
PATIENTS IN TIKUR ANBESA SPECIALIZED HOSPITAL, A
RETROSPECTIVE STUDY**

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June, 2024

Addis Ababa, Ethiopia

**The Prevalence of Acquired Neurologic Speech and Language Disorder
among Adult Neurologic Patients in Tikur Anbesa Specialized Hospital, a
Retrospective Study**

By: Betel Kebede

**A thesis to be submitted to Addis Ababa University College of
Education, Department of Special Needs, in partial fulfillment of
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ABSTRACT

Acquired neurologic speech and language disorders such as aphasia, dysarthria, apraxia and cognitive communication impairments can be caused by neurological conditions that interfere with communication. This study was aimed to assess the prevalence of acquired neurologic speech and language disorders and associated factors among neurologic patients at Tikur Anbesa Specialized Hospital that received care from January 2023 to December 2023. Retrospective study design on secondary data is used to randomly select records of 384 study participants. Clinical judgment of neurology residents or neurologist is used to as measuring tool for screening ANSLD. Of study participants, 52.9% were females and 47.1% were male. 53.4% were young adults (<50yrs) while 46.6% were old adult (>50 yrs). Among the neurologic conditions stroke was the leading (33.6%) while Huntington's disease was the least (0.3%). Prevalence of ANSLD was found to be 14.1%. Of ANSLD 38.9% of them had aphasia, Dysarthria and undifferentiated speech language disorders constitute 7.4% & 53.7% respectively. Stroke (AOR=25.7, 95%CI, 9.9-66.9, P<0.001), GBS (AOR=15.8, 95%CI, 1.4-179.5, P=0.026), MG (AOR=23.7, 95%CI, 3.5-160.8, P=0.001) AND MS (AOR=15.8, 95%CI, 1.4-179.5, P=0.026) were found to have significant association with ANSLD.in this study it is found that ANSLD was lower compared to other studies. Association observed with stroke, GBS, MG, & MS was consistent with other different studies. Based on the findings of this study, it is recommended that the Federal Ministry of Health should allocate adequate resources to integrate speech and language therapists in department of neurology at TASH. The Department of Neurology at TASH should follow universal measuring toll for screening acquired neurologic speech and language disorder.

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ACRONYMS AND ABBREVIATIONS

ANSLD	Acquired Neurologic Speech and Language Disorder
GBS	Guillain Barre Syndrome
ICU	Intensive Care Unit
MG	Myasthenia Gravis
MS	Multiple Sclerosis
MRN	Medical Record Number
OPD	Out Patient Department
SLT	Speech and Language Therapy
TASH	Tikur Anbesa Specialized Hospital

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

The ability to communication differentiates humans from other species and is essential to all aspects of life. The transfer of data, or messages, via a signaling system between a source and a recipient is known as communication. Humans communicate mostly through words; but there are other ways to convey meaning as well, including body language, nonverbal cues, and facial expressions (Bishop & Norbury, 2008). Neurologic conditions like Parkinson's disease, stroke Dementia, traumatic brain injury and other result in difficulties with communication which may negatively impact on person's life.

Speech involves creation of sounds, words, and phrases in a meaningful way through coordinated movements within the oral mechanism. Speech disorders encompass a range of conditions that can impede the ability to produce speech or result in speech that is unintelligible or atypical. These disorders encompass voice, speech sound disorders and stuttering.(Rosenbaum & Simon, 2016). Voice, Fluency, and Articulation are the main components of speech in which voice is how we use our vocal folds and breathing to create sounds; fluency is related to the flow of our speech and rhythm; and whereas articulation involves the production of speech sounds by using our mouth, tongue and lips (Nicolosi et al., 2004).

The processes involved in speech and voice production relay on phonation, resonance, respiration, prosody and articulation. These processes collaborate to ensure a combination of all elements necessary for natural conversational speech, including loudness, emphasis, and melodic patterns that enhance the overall meaning. (Miller, 2008).Language is a process encompassing both expressive and receptive aspect in which understanding or comprehension is receptive while conveying information, ideas and thoughts are expressive language .Sign language is also visual form of language (Zhang, 2008). Communication abilities undergo changes due to brain trauma, stroke or neurological conditions like Parkinson's (Lima et al., 2022).

Acquired and congenital neurologic communication disorders involve problems because of neurologic disorders and injuries (Carmichael, 2005). One of the common causes of neurological disorders that impacts communication is stroke (Jani & Gore, 2014). Aphasia is commonly observed in cases of left hemisphere injury. It can lead to a complete or partial loss of the ability to formulate, produce, and comprehend spoken and written language in affected patients (Cruice et al., 2003) Aphasia may co-occur with dysarthria or apraxia of speech (De Freitas, 2012). It can be categorized into fluent aphasia and non-fluent aphasia. When someone has fluent aphasia, they can still form sentences that sound normal, but they might use meaningless words or make erroneous sounds in certain words. Conversely, people with non-fluent aphasia find it difficult to recall words and speak in shorter phrases or without certain terms (Andreetta, et al., 2014).

Dysarthria is a motor speech condition that is associated with difficulties with different speech subsystems, including respiration, laryngeal function, direction of airflow, and articulation. It can be categorized based on the underlying neuropathology (Enderby, 2013). Hypokinetic dysarthria, characterized by reduced monotonous speech, limited frequency range, decrease loudness, imprecise articulation of consonants and vowels, breathiness, and irregular pauses, is observed in Parkinson's disease. This impairment significantly affects intelligibility, speech function, and eventually social participation (Moya & Levy, 2019).

Human communication depends on ranges of skills such as linguistic skills, cognitive, and motor skills. These skills form the foundation for individuals to generate appropriate communicative intentions, encode and decode linguistic utterances and plan and execute the movement necessary for production of those utterances (Cummings, 2014). Neurological disorders that interfere with communication can have significant effects on a person's day to day activities. The term communication encompasses all the behaviors that people connect with another to perceive and convey information (Sarno & Galgano, 2014).

1.2. Statement of the Problem

Acquired Neurologic speech and language disorders, involve complex problems as a result of neurological conditions or injury (Carmichael, 2005). An individual's health and overall quality of life can be significantly impacted by these problems. Researchers looked at aspects of hospital residents' health that affected their quality of life in Ontario, Canada. Looking into the

effects of 15 illnesses and 60 distinct diseases on the quality of life of 66,193 individuals, the findings indicate that aphasia, rather than cancer and Alzheimer's disease, has the greatest negative effect on quality of life (Kadojić et al., 1997).

Dysarthria has a profound effect upon the patient and their families as communication is integrally related with expressing personality and social relationships (Enderby, 2013). It is a frequent symptom of many neurological conditions and is commonly associated with progressive neurological diseases such as Parkinson's. Among MS patients, dysarthria is thought to be the most prevalent communication impairment. According to data gathered by the National Multiple Sclerosis Society, dysarthria in MS patients ranges in prevalence from 41% to 51 % (Miller, 2008).

Problems with speech and language are serious health issues that can affect people of all ages. Anyone can acquire aphasia .But most people who have aphasia are in their middle to late years (National Institutes of Health, 2016). In a study which was done in England shows that, older age was linked to the presence of aphasia and dysarthria among in patients stroke survivors (Mitchell et al., 2020) and Stroke-related aphasia is most likely to occur in older adults (Ellis & Urban, 2016). About 21-38% of acute stroke patients experience aphasia (Kang et al., 2010) and it is the most frequent cause of aphasia (Cruise et al., 2003). According to the data that is currently available Africa, may have 2-3 times greater rates of stroke prevalence than Western Europe and the US (Akinyemi et al., 2021) .It is the most prevalent neurological condition encountered in patients treated to general hospitals in Ethiopia (Tsehayneh & Tafesse, 2020).

Despite how critical this condition is a limited number of reported rates of these disorders in low income countries. According to data extracted from 75 articles published in 43 different countries between 2000 to 2021 reported, in high-income countries, the prevalence of aphasia ranged from 9% to 66%, In lower middle- and upper middle-income countries, 21 studies indicated a range of aphasia rates between 7% and 77%. However, there were no reported rates available from low-income countries (Frederick et al., 2022). To the author's knowledge, no research has been done on prevalence of acquired neurologic speech and language disorder in adults' patients particularly in our setting.

As a result, this knowledge gap makes it difficult to fully understand and to address these patients' and caregiver's needs. Understanding the prevalence of these disorders allows allocating appropriate resources, funding and specialized professionals. Adequate prevalence data so helps to provide necessary support and therapy at an early stage to improve outcomes and ensuring adequate support systems for patients and their care givers. The prevention of communication disorders is seen as crucial component of early communication intervention (Devadiga et al., 2014). To modify provision, planners and providers must also be aware of whether a condition will increase or decrease within a certain population.

Policymakers can use this information to promote accessibility and equity in healthcare. The data can also be used to help in evaluating the impact of various programs that are being implemented therefore to adjust strategies accordingly. Comparing prevalence rates across countries in different settings, will help identify best practices and learn from successful approaches taken by other. Research that systematically investigates the prevalence of acquired neurologic speech and language disorder and the associated factors facilitates the exchange of knowledge and collaboration in the field.

Based on the above facts, this study is designed to investigate prevalence of Acquired Neurologic Speech and Language disorders among adult Neurologic patients at TASH. Accurate and adequate prevalence data will lead to more effective planning of services. Therefore, this study aims to address this knowledge gap in our setting.

1.3. Objective of the Study

1.3.1. General Objective

To assess the prevalence of Acquired Neurologic speech, and language disorders and associated factors among neurologic patients at Tikur Anbesa Specialized Hospital from January 2023 to December 2023

1.3.2. Specific objective

- To assess the prevalence of Acquired Neurologic speech and language disorders.
- To identify clinical characteristics associated with Acquired Neurologic speech and language disorders.

- To identify the socio demographic characteristics associated with Acquired Neurologic speech and language disorder.

1.4. Significance of the Study

Finding of this study enhance Understanding prevalence of this lesser known disorder in our context which can help in planning public health interventions, allocating resources, public awareness and developing appropriate healthcare services to address the needs of individuals who are affected. Speech and language therapist's, neurologists and other health care professionals can benefit from this studies by gaining insights into the frequency of these disorders, which can aid diagnosis, and treatment planning for patients.

The dissemination of this study finding can influence healthcare policies and advocacy efforts at institutional and national .Knowing the prevalence of these disorders can lead to improved quality of life for affected individuals through better access to specialized services, therapies, and support systems. The result of this study can add by serving as a base for future research on the area and can contribute by facilitating comparisons with studies conducted in other parts of the world.

1.5. Scope of the Study

This retrospective prevalence study focuses on adult neurologic patients who are diagnosed and documented by neurologist and neurologic residents as having acquired neurologic speech and language disorder .The study specifically targets patients from different units of adult neurology department at TASH within a one-year period. The scope includes assessing the prevalence rates of these disorders and identifying associated Factors such as socio demographics and clinical characteristics from patient record to provide a comprehensive understanding of the prevalence of acquired neurologic speech and language disorders among adult patients at TASH.

1.6. Conceptual Definition of Terms

Communication disorder: A communication disorder refers to a condition where there is a limitation in receiving, transmitting, processing, and understanding concepts through verbal, nonverbal, or graphic symbol systems. This disorder can manifest in the domains of hearing, language, and/or speech processes (ASHA, 1993).

Acquired Speech and Language Disorder: Loss of previously learned abilities is represented by Acquired Disorders of Speech and Language, which typically have rather specific limitations (Bishop et al., 2014).

Speech disorder: Speech is the result of the intricately synchronized actions of the oral mechanism producing meaningful sounds, words, and phrases. Speech problems can cause speech to be aberrant or impossible to understand, or they can prevent speech from occurring at all (Rosenbaum & Simon, 2016). In this study from speech disorders, Dysarthria only will be studied.

Language disorder: The intellectual processing involved in communicating is language. Both expressive and receptive language is included. While expressive language is used to communicate ideas, feelings, thoughts, and facts, receptive language is used for comprehension or understanding. Although spoken language is the most typical way that people think of language, there are other visual forms as well (Purdy, E. R. (2008).

Aphasia; A disorder of language understanding and production resulting from abnormalities in certain brain a region is known as aphasia. It arises from a disintegration of the two-way translation that creates a mental correlation with language (Damasio, A. R. 1992). In this study aphasia is said to be present only when the patient is evaluated by a neurologist or neurology resident and documented to have aphasia.

Dysarthria: is a motor speech disorder linked to issues with breathing, laryngeal function, airflow direction, and articulation (Enderby, P. 2013). In this study, dysarthria is said to be positive only when the patient is evaluated by a neurologist or neurology resident and documented to have dysarthria.

Adults: All patients of age 18 years and above.

Incomplete Record: If speech language status of the patient is left unmentioned; socio-demographic and clinical characteristics are not fully documented, If the evaluation is not made by neurologist or neurology resident

ICU patient: Is a patient who has ever admitted to ICU at least once for neurologic problem.

Neuro-emergency patient: emergency patients are neurologic patients who had emergency presentation and received emergency care and sent home.

Stroke unit patient: are those who were admitted to stroke unit, at least once and have been discharged directly from stroke unit to home

Ward patients: a patient who has been ever transferred to ward from any unit except ICU

OPD patient: are patients who have never been to any other units of neurology except neuro- o

1.7. Limitation of the study

Since it is institution based study, it is amenable to selection bias. So, these findings cannot be generalized to the larger community.

CHAPTER TWO

LITRATURE REVIEW

2.1. Prevalence of Aphasia

2.1.1. Aphasia prevalence by age and sex

In study conducted in one of the hospital in Sweden, where 119 aphasia patients were assessed at 3, 6 and 18 months after stroke onset; Mortality among the aphasic patients during the 18-month follow-up was twice that in non-aphasics (36 vs. 16%). The proportion with global aphasia decreased from almost 25% acutely to a few per cent after 18 months, that with Wernicke's aphasia from 25% to less than 10%, whereas conduction aphasia increased from 13 to 23% during follow-up (Laska et al., 2001).

A retrospective study conducted at Kasturba Medical College, in India ,on epidemiology of communication disorder ,over one year duration which include pediatrics (0- 12 years), adult (12-50 years) and geriatric (Above 50 years) age groups, The prevalence was more for auditory disorders (62%)followed by language disorders (24%) and then speech disorders (14%). The disorders were more prevalent in males as compared to females for the disorders under study across all the age groups

In one meta-analysis women were reported to have aphasia due to stroke more often . In that review twenty five studies were included with total of 48,362 stroke patients. Of this 29.6% female stroke patients were diagnosed with aphasia (Wallentin, 2018). Aphasia is inability to understand and synthesize language due to injury to specific brain parts. It happens from interruption of the two-translation that facilitates correspondence between thoughts and language (Damaio et al., 1992). It can co-occur with other speech disorders (De Freitas, 2022).

The assessment of language function, which includes auditory comprehension, naming, repetition, reading, writing and spontaneous speech makes it possible to classify aphasia (Merriam-Webster 2001).Aphasia may co-occur with speech disorders, such as dysarthria or apraxia of speech, which also result from brain damage (De Freitas, 2012).

Two major forms of aphasia characterized by the fluency dimension are Boca's aphasia, the

major form of non-fluent aphasia, which is sometimes defined as an expressive or motor aphasia, and Wernicke's aphasia, the archetypical fluent aphasia, a receptive or sensory aphasia (Damico et al., 2010). repetition of speech, whereas comprehension and production tend to be much less impaired. Anomia is described by the failure to name or to retrieve names. Comprehension is either not impaired or only mildly impaired. All language modalities are affected in global aphasia (Whitaker, 2007).

A few years back, as part of a needs assessment, the National Aphasia Association (NAA) gave out over 2000 questionnaires to people with aphasia and their families. The participants in the survey were individuals who had experienced aphasia for a minimum of a year before the survey was conducted. Of these, 90% stated that their main concern was social isolation, and more than 75% said that they believed that people without aphasia frequently avoided interacting with those who had it due to the communication difficulties. 50% percent of respondents said that they lacked sufficient information about it and their doctors were uninformed of aphasia. 90% of respondents thought that public knowledge about aphasia is minimal, and 54% said they needed assistance from stroke clubs and therapy programs. Loneliness, trouble establishing friends, low self-esteem, and depression were specifically mentioned (Sarno, 1997).

2.1.2. Aphasia caused by stroke and its prevalence

The incidence of aphasia after stroke is about 30% (Cruise et al., 2003). About 21-38% of acute stroke patients experience aphasia and in the majority of cases the left perisylvian areas are damaged, though lesions are also found in the subcortical or right cortical regions in some cases (Kang et al., 2010). Around a third of stroke survivor's experience some level of aphasia and 12% of stroke survivors are still aphasic at six months, and between 30 to 43% of those affected will remain severely affected in the long term (Taylor, 2017).

Aphasia is observed to be more often in ischemic stroke than in hemorrhagic stroke (Lazar & Boehme, 2017). Estimated prevalence of aphasia in the global north is 0.1-0.4% (Freitas, 2012). Data from 75 articles published in 43 different countries between 2000 and 2021 are reported with sample sizes of stroke survivors ranging from 68 to 398,798. Rates of aphasia among those stroke survivors ranged from a low of 7% to a high of 77% of stroke survivors. In high-income countries with a range of aphasia rate: 9%–66% and 21 studies completed in lower

middle- and upper middle- income countries with a range of aphasia rate: 7%–77%. In contrast, there were no reported rates obtained from low-income countries (Frederick et al.,2022). To give a general indication from extrapolated figures of statistics by country in 2007, it is indicated that out of the estimated population (71,336,571) extrapolated prevalence of aphasia in Ethiopia is 262,266 (Muni, 2007). One study of patients with stroke, at black loin hospital in which a total of 104 patients were included. Among the most common presenting symptoms aphasia is (25%). 49% of them have hypertension as a risk factor (Zewdie et al., 2018). On a prospective observational study, in south west Ethiopia ,it is reported that ,Out of a total of 116 adult stroke patients .Aphasia is reported 70 (60.3%) as a clinical presentation (Fekadu et al., 2019).

2.1.3. Post stroke Aphasia and age

Understanding the socio demographic factors influencing aphasia outcomes is essential. Age is the main stroke-related factor that affects the outcome of aphasia in studies done on post stroke Aphasia. Research indicates that while strokes can happen to at any age, more than two-thirds of them happen above the age of 65.8. Additionally, stroke-related aphasia is most likely to occur in older adults. In a review of Forty studies which include 14,795 study participant from age group of young adults (≤ 50 years old) and older adults excluding pediatric age group, Observed that stroke patients with aphasia are older than those without aphasia. Its type and age are associated because younger patients with aphasia are more likely to exhibit Broca's type of aphasia (Ellis & Urban, 2016).

2.2. Dysarthria Prevalence

A primary feature of dysarthria is a poor speech-to-movement transition. It is typified by breathiness, irregular pauses, and lower vocal volume, a monotonous decline in the basic frequency range, and inaccurate vowels and consonants (Moya & Levy, 2019). It is a common symptom of a variety of neurological disorders and is frequently linked to the progression of neurological disease. It has a significant impact on patients and their families since social interactions and personality expression are closely linked to communication. A motor speech condition called dysarthria is categorized based on the underlying neuropathology. Breathing, laryngeal function, airflow direction, and articulation anomalies are its characteristics, which result in issues with speech quality and intelligibility (Enderby, 2013).

2.3. Prevalence of Co-occurrence of aphasia and dysarthria

Aphasia affects 12% to 38% of individuals who have experienced an acute stroke. As many as 8% to 30% of stroke victims have dysarthria. Retrospective analysis of pooled clinical trial data from the Virtual International Stroke Trials Archive showed that 45.4% of the 8904 patients had dysarthria and 69.5% had aphasia at baseline; the proportion of patients with both deficits was reported to be 29.6%. Aphasia and dysarthria persisted in 23.7 percent and 27% of individuals with dysarthria, respectively, after three months. In addition, a poor recovery was linked to both age and the severity of the first stroke (Ali et al., 2013).

Patients who have dysarthria and aphasia at the same time have a more severe status, dependency on the activities they have daily, poor outcome on their cognitive function when compared to other patients who have aphasia alone and dysarthria alone after their stroke (Kim et al., 2016). 24 percent of the 88,974 who had a stroke were having communication problems which are dysarthria and aphasia, 24 percent had dysarthria by itself, and 12 percent had aphasia by itself (Mitchell et al., 2020).

According to study conducted in South Africa, The majority of individuals (88%) had diagnoses that co-exist; 38.23% were dysphagia, dysarthria, and aphasia (Kaylor & Singh, 2023). In an Indian study analyzing 40 patients' communication and swallowing issues related to neurological illnesses, dysarthria (60%) was shown to be the most common disorder, followed by dysphagia (55%) and aphasia 18% (Jani & Gore, 2014).

2.4. Clinical Characteristics Associated With Speech and Language Disorder

2.4.1. Stroke

2.4.1.1. Prevalence of stroke

One of the leading causes of dementia, disability, and death worldwide is stroke. Africa may have two to three times higher rates of stroke prevalence other (Akinyemi et al., 2021). Cerebrovascular disease was reported to be the cause of 23.6% of all neurological admissions at Tikur Anbessa Specialized Hospital (Tsehayneh & Tafesse, 2020).

A blood clot, leaky, or burst vessel interrupts blood flow to a particular part of the brain, resulting in a stroke. When brain cells are denied their usual blood flow, which gives them vital

nutrients and oxygen, they die. Severe head injuries, brain tumors, gunshot wounds, brain disorders, and Alzheimer's disease, a degenerative neurological condition, are additional risk factors for brain injury (Freitas G. R. 2012).

Stroke is an acute cerebrovascular disease with high prevalence. Two categories can be used to classify strokes, Hemorrhagic and ischemic cerebrovascular illness. Following is the widely acknowledged clinical staging for stroke the Acute stage refers to the first two weeks; The biggest alterations happen during the sub-acute phase, which lasts from 3 to 11 weeks after a stroke; After a stroke, the early chronic stage lasts 12–24 weeks, while the chronic stage lasts longer than 24 weeks (Wu et al., 2015).

A stroke is a disease whose effects significantly lower a patient's quality of life (Bártlová et al., 2022). When a patient is admitted, a professional —typically not a speech-language pathologist—uses the NIHSS to measure the severity of the stroke. This simple, reliable stroke severity score consists of 15 components: consciousness, facial paresis, cognitive, vision, motor control, and sensory loss (Balamurugan, 2006).

2.4.2. Parkinson's Disease

2.4.2.1. Prevalence of PD

Men have a twice likely to be affected by PD than women (Cerri et al., 2019). In a study conducted from PD patient in Addis Abeba Ethiopia, forgetfulness accounts 45.5%, and Difficulty of concentrating or staying focused is reported to be 33.3% out of Total of 123 PD patients (Ayele et al., 2021) Individuals with PD experience voice, articulation problem and fluency disorders (Mackenzie et al.,(2011).

Communication disorders can have an adverse impact on a person's mental well-being and quality of life, especially when they are undiagnosed and untreated (Cummings, 2023).. Intervention for speech and language impairment is primarily delivered by speech and language therapy and supportive psycho educational management (Devadiga et al., 2014).In a neurological setting, the speech-language therapist will play an important role as members of the team in neurological set up with respect to identifying and this communication problems and treatment intervention

CHAPTER THREE

METHODOLOGY

3.1. Research Design

In this study, a 1 year retrospective study design with existing patient records was implemented. This methodology was chosen for its efficiency and time-saving benefits. Since retrospective studies analyze data that has already been collected; they are generally quicker to conduct. Moreover, it offers access to large sample sizes, enabling a more comprehensive analysis across a broader population. Additionally, this retrospective study design lays a solid groundwork for potential future investigations and more targeted prospective research in the field. By analyzing existing data, researchers can uncover valuable insights that can inform and guide more focused studies down the line. The scientific utilization of existing health record is common in prevalence study like this (Gearing et al., 2006). This research approach also allows for the exploration of trends and patterns that can contribute significantly to the body of knowledge in the field of study.

3.2. Study Site and Period

Tikur Anbessa Specialized Hospital (TASH) is the largest, main referral and teaching hospital in Ethiopia. It has 850 bed capacities. Yearly it serves for 50,000 inpatients service, 500,000 outpatient services and 40,000 emergency services. Almost all multidisciplinary specialists and subspecialists reside in TASH. It has around 200 doctors, 379 nurses and 115 other health professionals dedicated to providing health care services. The various departments, faculties and residents under specialty training in the School of Medicine provide patient care in the hospital.

The Department of Neurology in the school of Medicine provides inpatient, outpatient, Emergency, Stroke Unit, outpatient and Electrophysiology services. On average yearly it serves for 350 inpatient, 400 Emergency, 100 ICU and 15,000 outpatients (2 general Neurology Clinics and 5 Sub specialty Clinics). Each service is led by a dedicated neurology attending Neurologist and a Neurology resident physician.

This study setting was chosen due to, it is Referral Hospital that serves patient across the country .It possesses a team of neurologic specialists and residents ,making it well suited for observation of Acquired neurologic speech and language disorders such as aphasia and dysarthria which commonly seen in such specialized hospitals.

Study period; Medical record of Neurologic patients in neurology department at TASH , who are seen from January 2023 to December 2023 was used . This specific year was chosen as it represents the more recent data.

3.3. Source Population

All adult neurology patients admitted at the neurology ward, stroke unit, medical ICU, and outpatients followed at the neurology outpatient clinics in the Department of Neurology, Tikur Anbesa Specialized Hospital from January 2023 to December 2023. In this study majority of study participants were females (52.9%). The age distribution of study participants, range from 18years to 104 years, with mean age of 48.92years. Of total participants 205(53.4%) of the study subjects were young adults (<50yrs) while 179(46.6%) of them were old adults (>50years).

3.4. Target Population

All adult neurology patients with acquired neurologic speech, language and disorders admitted at the Neurology ward, Stroke Unit, Medical ICU and following at the Neurology out Patients Clinics at the Department of Neurology, Tikur Anbesa Specialized Hospital from January 2023 to December 2023.

3.5. Sampling Method

3.5.1. Sample size

was calculated using the formula $N = z^2 p(1-p) / E^2$

N= sample size

Z= 1.96 (95% confidence interval)

P= prevalence (Since there is no published or unpublished study on similar topic I will use 50% to calculate the sample size)

E= is margin of error (5% will be taken acceptable margin of error with 95% of confidence interval)

Using the above formula the sample size was 384 study participants.

3.5.2. Sampling Procedure

A total of 15,850 neurology patients were seen from January 2023 to December 2023 at TASH. Of these patients 3,008 of them were newly registered ones. These new patients were isolated based on their first date of registration. Records of 384 patients were randomly selected from different units of the department .Out of 384 patients 351were from OPD, 17 from ward, 3 from ICU and 13 from emergency stroke unit. Quota from OPD is proportionally shared among different subunits under it. Out of a total of 351 OPD patients 43 patients were seen at epilepsy sub unit ,87 were seen at stroke sub unit ,138 neuromuscular sub unit , 29 movement disorder and dementia sub unit, 35 general neurology sub units and 19 headache sub units of OPD . To avoid redundancy of cases operational definition is used to select patients that are seen in more than one unit.

Inclusion criteria

Participants were included in this study based on the following criteria

- Neurological Patients who have been seen in the outpatient Clinics,
- Neurological Patients who have been admitted to the neurology ward, stroke unit, or Medical Intensive Care Unit (ICU) , evaluated by a neurologist or neurology resident at TASH from January 2023 to December 2023
- Newly registered Adult neurologic Patients with complete data

Exclusion criteria

Participants were not included in this study based on the following criteria

- Participants were excluded from this study based on the following criteria
- Adults with established developmental speech and language disorders
- Adults with functional neurologic disorders/conversion disorder and catatonia

3.6. Variables

Dependent variables: prevalence of aphasia, Type of aphasia, Prevalence of dysarthria, Type of dysarthria

Independent variable: Socio-demographic: age and sex

Clinical characteristics: Stroke, types of stroke, Dementia, Parkinson's disease, GBS, unit care received at (ICU, Ward, stroke unit, and OPD), duration of illness and NIHSS.

3.7. Data collection tool

The socio-demographic data and clinical characteristics data related with other independent variables were gathered using structured questionnaire. The data related with acquired neurologic speech and language was retrieved from patient's record as documented by physician

3.8. Data collection procedure:

A letter of cooperation which was obtained from the special needs department and a copy of the proposal were submitted to department of Neurology at TASH. After reviewing the proposal by ethical committee at neurology department letter of cooperation was obtained and been submitted to I CARE department of TASH for opening of a research account and thereby accessing the data base of patients history. A list of all patients seen at OPD was taken from I care department and list of patients seen at other units of the department was taken from a record book of respective units. Then the MRN is inserted into excel sheet in their perspective domain and sorted in ascending order. After that a randomizer is used and then MRN are selected based on their respective quota from up to dawn.

Before commencing data collection a pilot test was done among 38 patient records (which are 10 % of the sample size) who presented at different units of neurology from January to December 2023. Data's of participants of this pilot study was excluded from final analyses. A questioner was prepared for data subtraction. Participants' names and other identifications were not included to keep confidentiality .All missing and incomplete files were treated as non-response. All non-responders were replaced by immediate MRN.

3.9. Data Quality Assurance

Both data collection and cleaning was done by principal investigator. Then the cleaned data was exported from excel to IBM SPSS Statistics 27.0. Then analysis was done and presented using tables and narratives.

3.10. Missing data management

Missing data such as patients having developmental conditions, without history, demographic data and clinical characteristics of patients are not fully documented was considered as missing and managed by substituting the next ^{patient's} MRN number of randomized data.

3.11. Data analysis procedure

Data were cleared before it was entered to IBM SPSS Statistics 27.0 and analysis was conducted to determine the prevalence of acquired neurologic speech and language disorders among study participants. The socio-demographic data, and data related to other independent variables, were also analyzed using a cross tabulation. The findings were presented using tables, graphs, and narratives.

3.12. Dissemination of Results

The finding of the study will be submitted to Addis Ababa University College of education and behavioral studies department of special needs, Addis Ababa University College of Health Sciences department of Neurology Tikur Anbesa Specialized Hospital, Ministry of Health, and other concerned bodies. The manuscript of the research will be prepared for publication. It will be presented on scientific conferences as well. Dissemination of this research result is essential for maximizing the impact of this research, thereby ensuring the findings are shared with the broader scientific community, allowing other researchers to build upon the work and contribute to the advancement of knowledge in the field .Dissemination of this finding will also allow policymakers, practitioners, the department of neurology and special needs education and the general public, potentially influencing decision-making, policies, and practices based on this study outcomes.

3.13. Ethical Considerations

Ethical approval from an institutional review board was taken. To maintain privacy and anonymity, appropriate measures were implemented to protect data and insure confidentiality. This includes the removal or di-identification of any personal identifiable information, thereby safe guarding confidentiality. In addition strict adherence to legal and ethical guideline was followed, including obtaining necessary permission and complying with regulations governing the use and sharing of the data.

CHAPTER FOUR

RESULT

4.1. Clinical Characteristics of study participants

The study participants came primarily for treatment of various neurologic conditions. Of these neurologic conditions stroke was the leading while Huntington's disease was the least. (Table 1)

Table 1

Distribution of Clinical Characteristics in the study participants

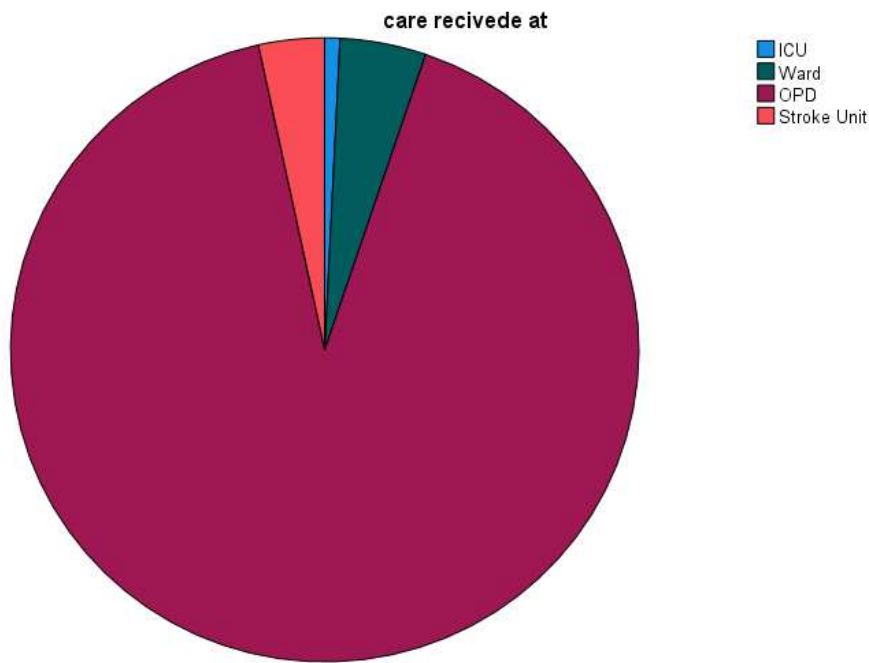
Clinical characteristics	Frequency	Percentage %
Stroke	129	33.6%
Dementia	14	3.6%
PD	24	6.3%
GBS	4	1.0 %
Epilepsy	52	13.5%
Headache	15	3.9 %
Neuropathy	35	9.1%
Radiculopathy	23	6 %
MG	6	1.6%
Back pain	36	9.4%
MS	4	1.0%
ALS	2	0.5%
Huntington's disease	1	0.3%
Others	39	10.2%
Total	384	100%

Note. n=384 PD=Parkinson's Diseases; MG= Myasthenia Gravis, MS=Multiple Sclerosis, ALS= Amyotrophic Lateral Sclerosis.

Among different units of neurology department at TASH, majority of the study participants 351(91.4%), received clinical care at outpatient department followed by ward (See figure 1). Of Stroke patients included, 82(21.4%) of them had ischemic type of stroke while the remaining 47(12.2%) of them are hemorrhagic stroke. Of 129 stroke patients only 5 of them had NIHSS score completed. So, it was impractical to use this tool in assessing speech language status of stroke patients included in this study.

Figure 1

Distribution of study participants among clinical units of neurology department TASH



4.2. Prevalence of Acquired Neurologic Speech and Language Disorders (ANS LD)

Of 384 study participants, only in 54 (14.1%) of the cases had acquired neurologic speech language disorders (See Table 3). Of these 21(5.5%) of them had aphasia while 4(1%) of them had dysarthria. Twenty nine (7.9%) patients were mentioned to have none specific language disorders. Examples of the descriptions include failure to communicate, communication difficulty, slurred speech, etc.

Of cases of aphasia, 11(2.9%) of them were Boca’s type. While Wernicke’s and global aphasias constitute 2(0.5%) cases each. The type of aphasia was not documented in a record of 6(1.5%) aphasia patients.

Table 2

Prevalence of Acquired neurologic speech and language disorder

Acquired neurologic speech and language disorders	Frequency	Percent
Yes	54	14.1%
No	330	85.9%
Total	384	100%

Note. Acquired Neurologic Speech and Language disorder is the sum of Aphasia, Dysarthria and nonspecific speech and language disorders.

4.2.1. Demographic Characteristics and Prevalence of Acquired Speech Language Disorders

Of all acquired neurologic speech language disorders, 28(61.1%) of them occurred among old adults (>50years old). The remaining 26(38.9%) was in young adults. Concerning sex distribution of acquired neurologic speech language disorders 27(50%) of them occurred in females while the other half was among males (See table 4). From sociodemographic characteristics Place of residency was not included in the result because of incomplete data record.

Table 3*Acquired neurologic speech and language disorders * Age category * Sex Cross tabulation*

Sex			Age category		Total
			Young adults	Old adults	
Male	ANSLD	Yes	15	12	27
		No	76	78	154
	Total		91	90	181
Female	ANSLD	Yes	11	16	27
		No	103	73	176
	Total		114	89	203
Total	ANSLD	Yes	26	28	54
		No	179	151	330
	Total		205	179	384

Note. ANSLD=Acquired Neurologic Speech and Language Disorder

4.2.2. Association between acquired speech language disorder and clinical characteristics

Of clinical conditions 90% of aphasia, 50% dysarthria, and 86% unspecified speech language disorders occurred in patients having stroke as their primary neurologic diagnosis.

Majority of aphasia cases 76%, half of dysarthria, and 58.6% of unspecified speech language conditions occurred in ischemic type of stroke.

On final model of logistic regression, stroke, GBS, myasthenia gravis, and multiple sclerosis were found to have statistically significant association with acquired neurologic speech language disorders. The odds of acquired neurologic speech language disorders, in stroke patients, were found to be 25.7 (95%CI=9.9-66.9, P<0.001) times when other confounding factors were controlled. The rest are depicted on (table 5).

Table 4*Association between acquired speech language disorder and clinical characteristics*

Variables	AOR	95% CI		P value
		Lower	Upper	
Stroke	25.7	9.9	66.9	<0.001
GBS	15.8	1.4	179.5	0.026
MG	23.7	3.5	160.8	0.001
MS	15.8	1.4	179.5	0.026
Constant	.0			0.000

Note. GBS Guillain Barre Syndrome MG= Myasthenia Gravies, MS=Multiple sclerosis.

CHAPTER FIVE

DISCUSSION

5.1. Prevalence of acquired speech language disorders

The prevalence of acquired neurologic speech language disorders found in this study is 14.1%. To be specific, aphasia is 5.1%, dysarthria 1% and none specific speech language disorders were 7.9%. These findings are low compared to most studies conducted elsewhere in the world. To mention some studies a retrospective study conducted at Kasturba Medical Hospital, the prevalence of language disorders was found to be 24% while that of speech disorder was 14% (Devadiga, et al., 2014). Another meta-analysis studies of 930 articles of speech disorders showed that the overall prevalence in older institutionalized adults was 33.03% (95% CI [26.85, 39.51], I² = 35% (Wang et al., 20123).

The variation in the prevalence of acquired speech and language disorder of the above mentioned finding of other studies and this study can be explained by methodological differences like most studies included participants of all age including children. The other reason could be because their study is conducted in ENT clinic while ours is at Neurology. The third important difference is that they didn't exclude developmental speech language disorders unlike this study which has tried to see only acquired conditions only.

In one prospective assessment of stroke patients at TASH, aphasia was found to be presenting feature in 25% of cases (Zewdie et al., 2018). Our finding is still lower than this study from the same setting but different study design. The difference in our finding can be due to difference in study design and because the study populations are only stroke patients .Another explanation for the difference can be, because of spontaneous remission of some patients presenting with speech language issues initially.

Another study, which is a meta-analysis by design, summarized 75 articles published in 43 different countries between 200 and 2021. All studies included are conducted among stroke survivors with a sample size ranging from 68 to 398,798. Rate of aphasia ranged from 7% to 77% of stroke survivors (Frederick et al., 2022).When we compare the finding of Aphasia in our

study with this one, though rate is lower in our case the sum of aphasia with the non-specified speech and language disorder rates , prevalence of acquired speech language disorder falls within the same range. The probable explanation for lower rate of aphasia in our case might be because of the difference in the study population. The meta-analysis was among stroke survivors while ours is among all neurologic conditions.

5.2. Speech language disorders in relation with demographic factors

The prevalence of acquired speech language disorders in this study is higher among older adult which is 61.1%. This is consistent with study conducted in southern Brazil that showed prevalence of aphasia to be higher among old ages (Lima et al., 2020) and in Community based study conducted in Iran, the prevalence of speech and language disorders was found to be highest among individuals of 75 years and above (Abbastabar et al., 2015) in the study speech disorders were found to be more prevalent among males .In Another descriptive study data (Mitchell et al., 2021) from the Sentinel Stroke National Audit program (SSNAP) investigated, older age was linked to the presence of communication impairment. But there are no prominent difference between men and women for the presence of either aphasia or dysarthria. Likewise a population survey conducted in a Brazil to assess prevalence of speech language disorders in elderly and young adults concluded that no significant difference was seen in both sexes in the distribution of speech language disorders (Dimer et al., 2021). Similarly In our study the speech language disorder was equally distributed among both males and females.

5.3. Clinical characteristics and speech language disorders

The odds of occurrence of acquired speech language disorders in stroke patients in this study is 25.7(95%CI=9.9-66.9, $P<0.001$) times higher than without stroke. This is in line with studies conducted on a total of 69 stroke patients of which 88% had communication related impairments (O'Halloran et al., 2009). In another study, 64% of the 88,974 stroke survivors had impaired communication (Mitchell et al., 2021). So, we can say that in these studies and ours the association between stroke and acquired communication disorder is strong.

Myasthenia gravies (MG) was also found to have statically significant association with acquired speech language disorder with AOR OF 23.7(95%CI=3.5-160.8, $P=0.001$). This is consistent

with findings of studies conducted on patients with myasthenia gravis by (Ayres et al., 2022). Multiple Sclerosis (MS) is also another clinical characteristics significantly associated with acquired speech language disorders with AOR OF 15.8(95%CI=1.4-179.5, P=0.026). This is in line with the fact that majority of MS patients showed a severe deficit on the word fluency and sentence construction subtests. In addition, a dysfunction in the comprehension of logico-grammatical constructions was also evident in most cases (Gerald et al., 2021). Finding of another study also indicated that MS patients experience communication changes across various domains. Based on the reviewed studies, they concluded that the speech system of MS patients is impaired to some extent, and the patients face many changes that impact their conversational ability and the production of slower and inaccurate speech (Plotas et al., 2023).

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

Generally, we can summarize that the prevalence of acquired neurologic speech language disorders found in this study is low compared to most studies conducted elsewhere in the world. The prevalence of acquired speech language disorders in this study is higher among older adult than young adult and its distributed among both males and females are equal. Prevalence of speech language disorders didn't show significant association with demographic factors. But Stroke, GBS, MG, and MS under clinical characteristics were found to have significant association with prevalence of acquired speech language disorders.

6.2. Recommendations

- The Federal Ministry of Health should allocate adequate resources to hospitals to integrate speech and language therapists into neurologists' teams to enhance the identification of acquired neurologic speech and language disorders. Furthermore, in partnership with the Federal Ministry of Education, the Federal Ministry of Health should facilitate the education and certification of speech and language therapists to address the shortage of professionals in this field.
- Department of Neurology at TASH should maintain a high level of suspicion for speech and language disorders and conduct universal screening for patients diagnosed with stroke, GBS, MG, and MS, as these conditions are strongly linked with speech and language impairments. Furthermore, the department should follow the implementation of using NIHSS score for stroke patients and universal measuring tool for screening acquired neurologic speech and language disorder.
- It is suggested that larger prospective multi-center studies with robust methodology should be planned and executed. By conducting studies, the aim is to provide more precise and conclusive findings that can significantly contribute to the advancement of knowledge in this area.

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ANNEX

MNR _____, Name of data collector _____

Date _____

s. no	Questions	Response	Remark
1	Socio-demographics information		
1.1	Age	-----Yrs	
1.2	Sex	0=male 1=female	
1.3	Place of residence	0=rural 1=urban	
2	Clinical characteristics	0=no 1=yes	
2.1	Stroke	0=no 1=yes	
2.2	Type of stroke	0=ischemic 1=hemorrhagic stroke 2=NA	
2.2	Dementia	0=no 1=yes	
2.3	Parkinson's disease	0=no 1=yes	
2.4	Multiple sclerosis	0=no 1=yes	
2.5	GBS	1=Yes 0=No	
2.6	Multiple sclerosis	1=yes 0=no	
2.7	Myasthenia gravis	1=yes 0=no	
2.8	Others	------(mention it)	
2.9	Unit care received at	0=ICU 1=Ward 2=OPD 3=stroke unit	
2.10	Presentation to hospital after the onset of the illness	0=immediately 1=after one day 2= within a week 3= After a week	
2.11	NIHSS score	1=present(score-----) 0=absent 2=NA	
3	Acquired neurologic Speech language status		
3.1	Aphasia	1=yes 0=no	

3.2	Type of aphasia	0=broca's aphasia 1=Wernicke aphasia 2=global aphasia 3=TC sensory aphasia 4=TC motor aphasia 5=mixed aphasia	
3.3	Dysarthria	1=yes 0=no	
3.4	Type of dysarthria	0=flaccid 1=spastic 2=ataxic 3=hyperkinetic 4=hypokinetic 5=mixed	