

Oral Language Conditions In Adults With Diabetes Mellitus 2 (Dm2)

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ABSTRACT

It is a descriptive study with a quantitative approach and cross-sectional design. This one was aimed at characterizing the oral language conditions in 66 adults with DM2 with a mean age of 62 years affiliated with a program for the promotion and comprehensive care routes maintenance for a subsidized public health provider institution. The anamnesis format was applied for the identification of the predisposing factors to language alterations based on the criteria included in the WHO Steps questionnaire (2006), and the Borrregón and González aphasia exploration and differential diagnosis test (2000). The SPSS Statistics version 24 statistical package was used for data coding and processing. The results indicated that adults with DM2 show predisposing factors for high blood pressure, heart problems, hypercholesterolemia, and obesity due to inadequate eating habits and physical inactivity. In addition, a handicap in the established expressive system by a low performance in the subsystems of long repetition, complex sentences, and after pauses. And also, in formulating sentences with one and two words, narrating before an image and on a given topic with the presence of literal paraphasias linguistic errors, perseverations, echolalias, and paragrammatism. As well as in comprehensive language difficulties in responding orally task to questions discovering subjects, understanding a heard text, and in figurative language evidence of circumlocutions, neologisms, anomies, semantic and unrelated paraphasias. In conclusion, the general findings of the oral language conditions of adults with DM2 indicate that they present compromises, with a greater decrease in expression in the subsystems of repeating, narrating, and formulating.

Keywords: Type 2 diabetes mellitus, expressive system, comprehensive system, oral language, clinical characteristics.

1. INTRODUCTION

Diabetes Mellitus Type 2-DM2 is a metabolic disease characterized by chronic hyperglycemia, due to a defect or action of insulin secretion (Rodríguez and Mendoza, 2019). Its effects produce complications in different body parts and increase the general risk of dying prematurely (WHO, 2021). At the central nervous system level, DM increases the probability of suffering a cerebral infarction by 8%, with DM2 being more related to macro-vascular damage, presenting between 2 and 3 times more probabilities of suffering a cerebral infarction compared to the general population. (Gutierrez et al., 2019). Likewise, DM2 increases cognitive impairment risk and, therefore, dementia development (Rodríguez et al., 2009 as cited in Yamakawa et al., 2018).

Regarding the cognitive characteristics that occur in DM2, cognitive changes associated with mild cognitive impairment and moderate damage to verbal memory or complex information processing have been reported (Petermann, 2018, Cerezo et al., 2018, Castillo, 2015). The increased probability of developing Alzheimer-type dementia in the long term (Luchsinger et al., 2007); and the heterogeneous cognitive deficits present, especially in high-level functions. It causes vascular and degenerative damage that DM2 produces on both cortical and subcortical structures. (Redondo et al., 2016).

Epidemiological data show an increase in DM2 cases worldwide (WHO, 2021). It is added to its implications for cognitive functions, including language, illustrating its magnitude and importance in the person's life quality, considering its social nature concretized through oral language. It represents the human being as a determining tool in the interaction process, which in turn is mediated by anatomy-physiological components and contextual order.

Given the above scenario, a trend is established in analyzing the behavior of the various cognitive functions in relation to DM2; Based on the published scientific evidence, and the investigative interest aroused in investigating language conditions characteristics in adults with DM2 when considered a public health problem, it is necessary to specify the need to comprehensively address it from the primary field health care. The people's linguistic behavior with DM2 in order to establish their performance conditions in the linguistic function, considering the comorbidities typical of the obesity pathology according to BMI and abdominal physical inactivity and inadequate eating habits (Milne et al., 2018); As well, as the development of hyperlipidemia associated diseases, arterial hypertension, heart disease, stroke, metabolic syndromes, non-alcoholic fatty liver, hyperuricemia, and neoplastic processes, among others (Cardona et al., 2017). Well, current health systems focus only on systemic effects (Castro and Rubio, 2011), leaving aside consequences at the language level, directly affecting the person's life quality and their family and social environment.

Thus, the research's importance and impact will generate care guidelines and knowledge development for language disorders management secondary to DM2 at the inpatient and outpatient levels. This contribution will bring light to the guidelines for evaluation processes and language disorders intervention of central origin produced by degenerative pathologies such as DM2. In addition, it will justify the design and program execution for the promotion and maintenance of communicative health at the different health care levels, opening workspaces for the professionals in speech therapy.

2. MATERIALS AND METHODS

The research was framed under a descriptive study type with a quantitative approach, and a cross-sectional design. The population was made up of 201 subsidized regime members belonging to the program for the comprehensive route's promotion and maintenance of the health provider institution "La Campiña" from Sincelejo, Sucre-Colombia. The 66 users were selected through a non-probabilistic intentional sampling for convenience, who met the user's inclusion criteria with DM2 diagnosed by internal medicine with clinical and para-clinical tests of glycosylated hemoglobin (HbA1c). They were aged between 55 and 65 years with an appearance time of the entity of more

than 5 years, and patients' exclusion with neurodegenerative pathologies and language disorders acquired prior to the onset of the disease.

To achieve the objectives, it was necessary to make an approach to the administrative management of the subsidized regime health provider institution to access the relevant permits and obtain the database and users' clinical history. Likewise, it was executed an interview with the investigated subjects to explain the project magnitude and characteristics and guarantee their participation with the voluntary signing of the informed consent in accordance with the ethical regulation in research with human beings in Colombia determined by resolution 008430 of the Ministry of Health. (1993) It establishes the scientific, technical, and administrative standards in health and at an international level the ethical principles of the Helsinki Declaration (2013).

The information collection was developed through the individual anamnesis format application for the identification of predisposing factors to language alterations based on the criteria included in the Steps questionnaire of the World Health Organization in its basic version (WHO, 2006). Regarding the hypertension variable, the reference values were taken in accordance with the provisions of the European Society of Hypertension and the European Society of Cardiology. Likewise, the overweight concept was considered according to the standards defined by the WHO, classifying normal (<24.9), overweight (≥ 25), obese (≥ 30), and underweight (<18.5) (WHO, 2018). Similarly, for the reference values and to determine the lipid profile, what was proposed by the National Cholesterol Education Program (NCEP) Adult Treatment Panel III (ATP-III) was taken as a basis (NCEP, 2001 Rubio et al., 2005). In addition, the variable cardiovascular conditions were determined based on the information referred to in the clinical history, and that referring to smoking habits, alcohol intake, and psychoactive substances use were specified based on the questions included in the applied anamnesis.

In an analytical and functional direction, the Borrregón and González (2000) aphasia differences diagnostic test was applied. It allows the language sample registration in the terms that respond to the comprehension and expression systems exploration. It detects the performance degree with the scores synthesis established in lower percentages from 0 to 79 referring to systems that are handicapped or compromised with the presence of linguistic errors. When they reach a performance of 80 to 100 a preservation allows interpreting descriptively the normal subjects' linguistic performance.

The SPSS Statistics version 24 statistical package was used for data coding and processing. The analysis types were performed according to the scales of the quantitative variables. It estimates the variables' descriptive statistics with an interval or ratio scale, calculating the minimum, maximum, and range values, arithmetic averages, standard deviations, and the typical error of the mean; and in the qualitative variables, the frequency distribution tables were estimated for each categorical variable.

3. RESULTS

Table 1 shows the sample's general clinical characteristics, the findings indicated that adults show predisposing factors for arterial hypertension 59 (89.3%), heart problems 54 (81.8%), hypercholesterolemia 52 (78,8%), and obesity 56 (84.8%) due to inadequate eating habits 51 (77.2%) and physical inactivity 49 (74.3).

Table 1: Clinical characteristics of the sample according to a nominal measurement scale, determining a qualitative value of present or absent of the associated factors

Clinical features	Qualitative value	Qualitative value
	Present N (%)	Absent No. (%)
Arterial hypertension	59(89.3%)	7(10,7%)
Heart problems	54(81,8%)	6(18,2%)
Hypercholesterolemia	52(78,8%)	14(21.2%)
Obesity	56(84,8%)	10(15,2%)
Inadequate eating habits	51(77,2%)	15(22,8%)
Physical inactivity	49 (74,3)	17(25,7)
Smoking	4(6,1%)	62(93,9%)
Alcoholism	3(4,5%)	63(95,4%)
Use of psychoactive substances	0(0,0%)	66(100%)

Table 2 details handicaps in the expressive system established by poor performance in the repeating, narrating, and formulating subsystems evidenced by a mean of 17 ± 26 , in the long sentences repetition after pauses 71 ± 22 , with the presence of literal paraphasias linguistic errors, perseverations, and/or echolalias. Likewise, in the narrating aspect before a complex image (30 ± 22), formulating sentences with one and two words (46 ± 51), and narrating orally on a given topic (39 ± 27), evidencing syntactic a grammatist in the description when organizing coordinated or juxtaposed constructions that are limited by the few abilities in the simple sentences structuring with quoted words with manifestations of phonetic paraphasia and perseverations in emissions. It determined a limited organization of oral discourse in syntactic structures and narratives process.

Table 2: Language conditions in the expressive system according to the results of the aphasia differential diagnosis test

EXPRESSIVE SYSTEM	SUB-SYSTEMS	Media	D.E ±	Range	P.Min	P.Max
Repeat	Repeat syllables	98	5	50	50	100
	Repeat words with varying syllabic complexity	95	8	30	70	100
	Repeat long and complex sentences	17	26	90	0	90
	Repeat phrases after a pause	71	22	80	20	100
Oral automatisms	Evoke series	83	21	75	25	100
	Evoke the name of elements present	95	22	100	0	100
Narrate and formulate	Communicate spontaneously	98	12	60	40	100
	Narrate before a complex image	30	22	75	0	75
	Formulate sentences with one and two words	46	51	100	0	100
	Narrate orally on a given topic	39	27	100	0	100

Table 3 details handicaps in the responding orally tasks to questions discovering subjects (58±14). It was determined by difficulties in storing and retaining auditory stimuli, reflecting on a sentence orally, decoding the meaning, and justifying it, with the semantic paraphasias presence, anomie, and circumlocutions in the subsystem of understanding a heard text (52 ± 22). It indicates an incipient ability for reading comprehension and meaning in heard verbal tasks with anomie evidence with prolonged latencies, neologisms, and unrelated semantic paraphasias. Regarding figurative language (48±24), they show compromises in storage and retention capacity, and reflecting on a sentence orally implies analysis processes and synthesis. However, the comprehensive subsystems' normal performance of recognizing the oralization of images (99±7), identifying functional gestures (93±21), pointing to named images (97±16), and performing functional gestures (99±3) is described.

Table 3: Language conditions in the comprehensive system according to the results of the aphasia differential diagnosis test

SYSTEMS	SUB-SYSTEMS	Media	D.E±	Range	P.Min	P.Max
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Recognize	Recognize the oralization of images	99	7	60	40	100
Pointing	Identify functional gestures	93	21	100	0	100
	Point to named images	97	16	90	10	100
Understand	Respond orally to questions discovering subjects	58	14	60	40	100
	Understand a text heard	52	22	100	0	100
	Understand figurative language	48	24	100	0	100
	Perform functional gestures	99	3	0	80	100

Table 4 specifies the oral language performance of adults, indicating a compromise in the expressive and comprehensive systems according to the normative data of the evaluative test 79 ± 9 , determining a lower performance in expression (72 ± 13) due to difficulty in the tasks of the dimensions of repetition, oral automatism, narrating and formulating; in the comprehensive language (86 ± 7) determined by an incipient ability to perform the tasks of the recognizing subsystems, signaling and understanding, characterized by comprehensive linguistic errors presence of circumlocutions, anomies, and semantic paraphasia, and unrelated; from the expressive to literal paraphasias, echolalias, and perseverations.

Table 4: General oral language conditions according to the results of the aphasia differential diagnosis test

LANGUAGE	Media	D.E ±	Range	P.Min	P.Max
System Expressive	72	13	50	42	92
System Comprehensive	86	7	26	70	96
General oral language system	79	9	33	60	93

4. DISCUSSION

In relation to clinical variables, the findings determine that hypercholesterolemia, high blood pressure, heart problems, and obesity are found in the highest proportion of adults with DM2. It determines that it is common to find high blood pressure in diabetic patients, and complications prevalence to microvascular level with a synergistic effect on the target organs: kidney, eye, and heart

and as a predictor for DM2, independently of other associated factors: age, peripheral vascular disease and obesity due to sedentary lifestyle and overeating habits (Espinoza et al., 2017, Brunström & Carlberg, 2016, and Noa & Chang, 2013). Likewise, there is an association between blood pressure and adverse cardiovascular outcomes (Cardona et al., 2017). It requires special attention due to cardio-cerebrovascular risks, which in frequent cases trigger a diagnosis and stroke cause of origin. ischemic and/or hemorrhagic cerebral infarction (Barrera et al., 2012, McGuire, 2013, Soto et al., 2019). That secondarily causes compromise at the middle cerebral artery level that triggers aphasia which is characterized by a defect in the ability to understand or express language in its written or spoken forms (Pasuy et al., 2013).

Regarding the expressive language system, the results indicated that the majority of adults with DM2 showed an incipient ability to repeat syllables, words with different syllabic complexity, and long and complex sentences; due to failures in the listening comprehension domains and oral expression processes (Borregón and González, 2000). For the state conservation of auditory discrimination is required since they allow an adequate ability to hear and reproduce the oral message (Imarai et al., 2013). Since they constitute one of the elementary mechanisms in the expressive system (González and Hornauer, 2014). Thus, diabetes mellitus causes damage to the auditory nerve and internal auditory artery, leading to neuronal degeneration of the auditory apparatus (Imarai, et al., 2013), therefore, patients with DM present a reduction in the perceptive capacity of the information contained in the auditory stimuli, indicating problems in understanding a material heard from auditory referents and difficulties in auditory discrimination (Cañete, 2006). Since the affectations generate an inability to discriminate, recognize and understand the original information auditory. (Zenker, 2003). In addition, certain limitations were established in the syntactic organization and oral discourse structuring in a large part of people with DM2 in narrating aspects before a complex image and on a given topic, formulating sentences with one and two words determined by a difficulty in the ability to use morphological structures that may be due multiple variables functions of the language verbal fluency, in which the informal or directed context significantly influences the oral emission average length a speech sample. Likewise, education levels measured from the cognitive point of view affect the construction level of sentences when it comes to properly select the syntactic elements to produce oral discourse that usually use the usual lexical resources that limit the use of structures. new. Gomez (2019).

However, in the comprehensive language, the results indicated that the majority of adults with DM2 presented an incipient ability to understand the meaning of the verbal tasks heard, storage, retention, and reflection before a sentence orally. This can be explained by the findings of Gómez (2011), who states that in the patient with diabetic DM2, there is a certain affectation in auditory analysis and synthesis processes. In addition, to the processing and semantic memory speed, it is sustained that these aspects greatly interfere with the adequate development of auditory processing systems.

The general oral language conditions findings of adults with DM2 determine commitments in the expressive and comprehensive systems in the specific subsystems of repeating, narrating, formulating, and understanding. However, a greater commitment is established in expressive

language. Therefore, patients with DM2 show moderate cognitive damage in verbal memory or in complex information processing due to primary diabetic encephalopathy due to the persistent state and the evolution time of hyperglycemia due to the association with apoptotic neuronal loss and higher brain functions deterioration, especially in the semantic and expressive dimensions (Castillo, 2015, and Gómez, 2011). In addition, it is considered that people with DM2 present a risk of suffering concomitant language alterations due to their progression, having a predisposition to suffer a decrease in communicative cognitive functions due to their relationship with degenerative diseases that show early signs and symptoms at the inhibitory and/or excitatory language. Likewise, DM2 potentially induces secondary dysfunctions presentation of a cerebrovascular accident with various complexity levels that can range from specific difficulties in expression and comprehension to a global loss causing a more severe sequel. (Roncero, 2018, Arrieta et al., 2015, and Pasuy, 2013).

5. CONCLUSIONS

In relation to the clinical characteristics, it was determined that the predisposing risk factors of adults with DM2 are determined by hyper-cholesterolemia risk, high blood pressure, heart problems, and obesity due to physical inactivity and inadequate eating habits. It suggests a cardiovascular risk. In relation to the expressive system characteristics of adults with type 2 diabetes mellitus, they showed handicapped performance in the repeating long subsystems, complex sentences, and after pauses with the linguistic errors presence of literal paraphasias, perseverations, and/or echolalias. Likewise, difficulties in narrating aspects before an image, formulating sentences with one and two words, and narrating orally on a given topic with paragrammatism evidence. Similarly, in the description of the comprehensive system conditions of adults with DM2. It established commitments in the tasks of responding orally to questions discovering subjects, understanding a text heard, and in figurative language, semantic paraphasia linguistic errors, and not related circumlocutions and anomies. In the general conditions of oral language, a greater commitment was evidenced in the expression in the subsystems of repeating, narrating, and formulating.

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