AUDITORY AND BALANCE RISK PROFILE OF PUERTORRICAN DIABETICS PILOT STUDY

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INTRODUCTION

- Nearly 30 million people in the U.S. have diabetes, and an estimated 34.5 million have some type of hearing loss. A recent study found that hearing loss is twice as common in people with diabetes as it is in those who don't have the disease (Horikawa et al. (2013). Also, of the 86 million adults in the U.S. who have pre-diabetes, the rate of hearing loss is 30 percent higher than in those with normal blood glucose. Previous studies also found that diabetes is highly prevalent in Latin communities in the U.S.
- For fourteen consecutive years Puerto Rico (1996-2010) has been first in the U.S. and its territories for having the highest prevalence of diabetes (PR Diabetes Center).

INTRODUCTION

- Accordding to the nacional survey "Behavioral Risk Factor Surveillance System" performed annually by the Centers of Control and Prevalence of Diseases, diabetes is a condition of high prevalence in Puerto Rico, being 12.8% in 2010. Therefore it is estimated that more than half a million Puerto Ricans on the island suffer from the condition. This points to ethnicity as an important variable to take into account in studying this pathology and its effects on the hearing and balance system.
- The Objective of the present research is to establish an auditory and balance risk profile of the Puerto Rican adult with diabetes.
- A future goal is to assess hearing health service disparities in these patients and the inclusion of auditory and balance screening and other treatment options as part of their follow up.

JUSTIFICATION AND OBJECTIVES

- At themoment there are no available data in Puerto Rico regarding association between diabetes and auditory and balance problems. Therefore the aim of this study is to develop an auditory as well as a balance risk profile of diabetic patients in the island from a clinical perspective.

Other future goals are:

- 1-provide a framework to create intervention protocols for this sector of the population
- 2- Use the data as a reference for other health professionals such as primary physicians and clinicians to include hearing assessment as well as balance screening as part of the primary care of these patients.
- Identify possible risk factors for hearing loss in this population that can aid health educators to patients regarding auditory and balance health.

RISK FACTORS ASSOCIATED TO HEARING LOSS

- Bainbridge, Hoffman y Cowie (2011) performed a study to examine risk factors for hearing loss in a sample of 536 patients with Diabetes between ages of 20 and 69 years of age. The factors identified were:
- 1- Low levels of high density lipoprotein
- 2- Coronary Disease
- 3- Periferal neuropathy

- Coronary disease is very prevalent and a mayor cause of death in Puerto Rico

RISK FACTORS ASSOCIATED TO HEARING LOSS

- There is no concensus in the literature regarding the pathologic changes in the auditory system of diabetic patients.
- The principal changes proposed are:
- 1- Nutrient transfer interference
- 2-Angiopathy
- 3-Eight Nerve degeneration and neuropathy (Malucelli et al., 2012).
- 4-In patients with Type II diabetes, Fukushima et al. (2006) reported cochlear angiopathy and degeneration of the stria vascularis. They also found outer hair cell loss at the base of the cochlea and thicker blood vessels at the basilar membrana. However, no significant difference in the number of spiral.ganglia cells was found.

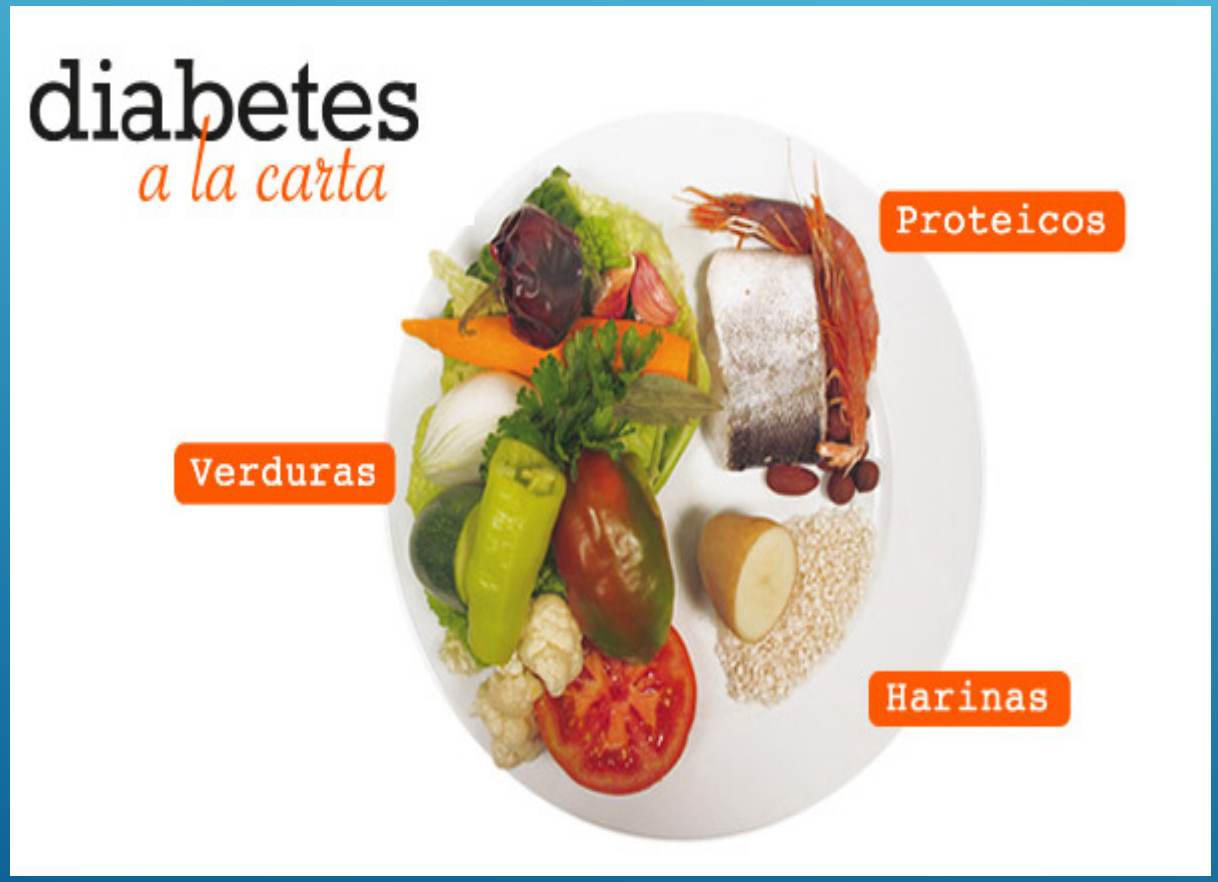
RISK FACTORS ASSOCIATED TO HEARING LOSS

- In 2012, Malucelli et al., performed research using an animal model with diabetic rats where he observed a reduction in the number of spiral ganglia cells in chronic cases. Accoding to Malucelli and colleagues and Diniz and Guida (2009), artheriosclerosis and demielinization contribute to neuropathy because they interfere with nutrient transport. Also, metabolic disorders that affect glucoside and lípids, have been pointed out as principal ethiological factors associated to hearing loss, tinnitus and dizziness (Ferreira et al., 2000).

VARIABLES ASSOCIATED TO DIABETIS IN PUERTO RICANS

GENETIC PREDISPOSICION IN PUERTO RICANS

CULTURAL: PUERTO RICAN DIET IS A FACTOR ASSOCIATED TO DIABETES\HIGH IN CARBOHYDRATES (REMINISCENCE OF THE INDIAN TAINO CULTURE ON THE ISLAND)



RESEARCH PROTOCOL

SUBJECTS

- Type two (II) diabetic patients from 21 to 60 years of age with a medical diagnosis

- No congenital hearing loss, childhood middle ear involvement or other auditory problems

- Puerto Ricans that live in Puerto Rico

- Spanish Speakers that can read and write the language

RESEARCH PROTOCOL

TESTS PERFORMED

SOCIO-DEMOGRAPHICAL PROFILE

AUDIOGRAM AND OTOACOUSTIC EMISSIONS

MIDDLE EAR FUNCTION BATTERY (tympanonetry, Reflexes, Decay)

TINNITUS MATCHING, TINNITUS HANDICAP INVENTORY SPANISH VERSION (In the case they report Tinnitus)

BALANCE SCREENINGS

(Dynamic Acuity Test, Dizziness Handicap Inventory, Fukuda, Romberg, Time Up test, One leg stand)

PILOT PROFILE RESULTS IN PROGRESS

Five subjects have been fully profiled. The target is 50 minimum. (The recruiting process of the project was interrupted by an electronic infrastructure problem)

1- Bilateral Sensorineural Hearing Loss. This case had a subjective report of problems with speech recognition which were not consistent with her speech recognition results in silence which was good. Distortion Product Otoacoustic Emissions were normal. Transients were under clinical criteria mostly. Middle ear function Tests were normal. No tinnitus reported. (Case 1- Female).

2- Bilateral mixt hearing loss. Chronic (recurrent) Middle ear pathology was reported by the patient which required constant ENT Monitoring and progressed to a mastoiditis and a tympanic membrane perforation. The middle ear pathology did not began until 10 years after the Diabetes Diagnosis. (Case 2-male). Middle ear function tests were abnormal. Good Speech Recognition in silence bilaterally. No tinnitus.

3- Difficulty understanding Speech subjectively reported and corroborated by the affected speech recognition test in silence although her hearing thresholds were normal or borderline normal. Distortion Product OAEs were registered however the Transient Emissions were under clinical criteria. Normal middle ear function. No tinnitus (Case 3-female).

PILOT PROFILE RESULTS IN PROGRESS

4- Bilateral moderate to severe sensorineural hearing loss. Good speech recognition in silence in both ears. Normal middle ear function. Cochlear dysfunction as registered by Otoacoustic Emissions (Both Distortion Product Otoacoustic Emissions as well as Transient Evoked Otoacoustic Emission were below clinical criteria). Bilateral transitory tinnitus episodes reported but did not have it while she was undergoing the study protocol. (Case 4-female).

5- Bilateral mild to moderate sensorineural hearing loss. Good speech recognition in silence in both ears. Normal middle ear function. Cochlear dysfunction as registered by Otoacoustic Emissions (Both Distortion Product Otoacoustic Emissions as well as Transient Evoked Otoacoustic Emission were below clinical criteria). No tinnitus reported. (Case 5-female).

All subjects pass the balance screening

PILOT FINDINGS AND AREAS TO EXPLORE

- 1- Middle ear problems and conductive components in the Diabetic population. How prevalent are they ?
- 2- Findings in Otoacoustic emissions. How Distortion Products are affected versus Transient Otoacoustic Emissions and why ?
- 3- Speech Recognition Results In silence vs. in background noise. Is this associated to cochlear pathology, synaptopathology or neural pathology ?. Can this be a manifestation of “hidden hearing loss” ?
- 4-Central Auditory Processing Effects on this population.

PROJECTIONS

1- Continue recruiting more subjects that comply with inclusion criteria.

2- Extend the recruitment age to 70 to examine that age group.

3- Add more masculine subjects.

4- Study (separate) groups based on the time of the diagnosis

5- Exchange and compare results with Puerto Rican and Hispanic Cohorts in the US and other parts of the world.

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QUESTIONS ???? ¿¿ PREGUNTAS ????