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Hearing loss among people living with Type 2 Diabetes Mellitus in the Pacific Islands: A literature Review for the Development of Clinical, Public Health, and Research ENT/Audiology Services in Samoa.

Annette Kaspar [1,2*], Sione Pifeleti[1]

[1]ENT Department, Tupua Tamasese Hospital, Ministry of Health, Apia, SAMOA

[2]Audiology Division, School of Health and Rehabilitation Sciences, University of Queensland, Brisbane, Australia

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***Corresponding author:** Annette Kaspar, ENT Department, Tupua Tamasese Hospital, Ministry of Health, Apia, SAMOA.

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Abstract:

Introduction: Type 2 Diabetes Mellitus (T2DM) is a public health crisis in the Pacific Islands, and improved prevention and management of T2DM is a major health priority for the Pacific region. Hearing loss may be described as the silent complication of T2DM. Routine referral for auditory assessments for people living with T2DM in Pacific nations is non-existent. Ear, Nose & Throat (ENT) and Audiology Specialists are limited in the Pacific region, however, an approach that combines clinical and public health services should positively impact the burden of hearing loss associated with T2DM in the Pacific Islands.

Materials and Methods: Literature review. PubMed and ScienceDirect databases were searched for relevant journal articles. Key search terms were "Pacific Islands", "diabetes mellitus", "hearing loss" and their relevant synonyms. There was no limit on the date of publication.

Results: No journals were found that met the inclusion criteria.

Conclusions: Data are needed to support the implementation of ENT/Audiology services into routine care plans for people living with T2DM in the Pacific Islands. The inclusion of both clinical and public health ENT/Audiology services should make a positive contribution to current efforts for people living with T2DM in Samoa and other Pacific Island nations.

Keywords: pacific islands; type 2 diabetes mellitus; hearing loss; health promotion; prevention

1. Introduction

According to the International Diabetes Federation Diabetes Atlas, the Pacific Islands have among the highest prevalence rates of diagnosed and undiagnosed Type 2 Diabetes Mellitus (T2DM) in the world [1,3]. The most recent estimates report that seven of the top ten countries with the highest prevalence rate of diagnosed T2DM are in Pacific Island countries or territories [1]. This is generally attributed to the increase of unhealthy lifestyles associated with rapid socio-economic development [4]. Addressing the public health crisis of T2DM is a major goal of the Pacific Island region under the Sustainable Development Agenda [5]. and this should have a positive impact on the current predictions for T2DM mortality and morbidity rates into the future [6,7].

Hearing loss may be described as the silent complication of T2DM [8,14]. Although the exact role of T2DM in the development of auditory disorders is still controversial, there is consensus that individuals of all ages with T2DM have a higher prevalence of permanent hearing loss than their non-diabetic counterparts. In the past, when diabetic patients were predominantly in the over 65-years age group, it was difficult to distinguish between the natural history of age-related hearing loss (i.e., presbycusis) and the possibility of hearing disorder due to T2DM [12]. As the population of adults living with T2DM is now also in a younger age group, the impact of diabetes on hearing abilities is becoming clearer [15,18].

There are a number of studies reporting on T2DM in the Pacific Islands. A systematic literature found an overall diabetes prevalence rate of approximately 40%, with

with physical inactivity and overweight/obesity as the leading risk-factors [19]. An investigation of Melanesian countries reported that retinopathy was the most common T2DM complication, followed by abnormal foot sensation [20]. Although duration of T2DM was the leading risk-factor for both eye and foot complications, improved metabolic control did not appear to have a significant impact [21]. The most visible sequelae of advanced T2DM are foot/limb amputations [22]. From the Polynesian nation of Samoa, there were two reports on kidney failure and haemodialysis, and the discussions noted T2DM as a leading co-morbidity [23,24]. One report from Vanuatu documented the substantial economic cost of T2DM medical care to the country [25]. There were no reports on auditory dysfunction among people living with T2DM in the Pacific Islands.

The national clinical management guidelines for people with T2DM are currently under review in Samoa, one of the Polynesian nations of the Pacific Islands. The country established its only Ear, Nose & Throat (ENT) Clinic in 2017 at the national Tupua Tamasese Meaole Hospital under the leadership of a General/ENT Surgeon (author SP), and an Australian research audiologist joined the team in 2019 (author AK). The ENT/Audiology Clinic of Samoa has been given an opportunity to contribute to the updated national guidelines of people living with T2DM. The aim of the present paper is to perform a literature review on hearing loss among people living with T2DM in the Pacific Islands. This should enable evidence-based recommendations regarding ear and hearing health policy for people living with T2DM in Samoa.

Methods

A literature review was conducted using the PubMed and ScienceDirect databases. The main search strategy used the terms and keywords "Pacific Islands", "Diabetes Mellitus", "hearing loss", and their relevant synonyms (i.e.,"hearing impairment"): "Pacific Islands"[MeSH Terms] OR ("Pacific"[All Fields] AND "Islands"[All Fields]) OR "Pacific Islands"[All Fields]; "Diabetes Mellitus"[MeSH Terms] OR ("Diabetes"[All Fields] AND "Mellitus"[All Fields]) OR "Diabetes Mellitus"[All Fields]; "hearing loss"[MeSH Terms] OR ("hearing"[All Fields] AND "loss"[All Fields]) OR "hearing loss"[All Fields]. Following this search strategy, titles and abstracts were read and reviewed, and, when appropriate, included for further study. The selected articles were read completely, and their references were hand-searched.
The following inclusion criteria were used to assess article suitability for this review: (1) the study population were Pacific Islanders with T2DM residing in the Pacific Islands, and (2) the study reported ear and hearing health outcomes for the study population. There was no limit on the date of publication.

2. Results

No journal articles were found that met the inclusion criteria.

3. Discussion

There are currently no publications on the current state of hearing loss among people with T2DM in the Pacific Islands. Data would be beneficial to guide evidence-based health policy formulation and implementation. However, the lack of data from the Pacific Islands should not deter current efforts to establish routine ear and hearing health assessments for people living with T2DM in Samoa. Indeed, the implementation of a pilot ENT/Audiology program at the Tupua Tamasese Meaole Hospital should provide preliminary data at a future date, and guide further development of the program. Based on the global literature for hearing loss among people living with T2DM, we make the following recommendations for our context in Samoa.

1.1. Clinical and rehabilitation ENT/Audiology services for people with T2DM

Routine ENT/Audiology assessment is advocated for all people with T2DM. The early stages of hearing loss among adults in the 40–60-year age group often goes unnoticed [16,26]. and early consultation with an ENT Specialist and/or audiologist is an ideal opportunity to discuss adherence to diabetic management plans to prevent/minimize/delay progression to diabetic complications, such as permanent hearing loss. This should reinforce and support health messages already provided by other medical staff involved in their care and, therefore, should positively contribute to changes in health behaviour (i.e., healthier diet, cease tobacco smoking, etc…). There is also evidence that people with T2DM may experience Sudden Sensorineural Hearing Loss, a condition where hearing ability is lost suddenly and permanently [27,28]. A baseline hearing test result for all people with T2DM would therefore be beneficial to document any reported changes.
People with T2DM in the 65 years and older age group may be experiencing both age-related hearing loss and additional deterioration due to T2DM [12,29]. Review for these individuals would be beneficial as it would facilitate auditory rehabilitation options, such as communication strategies and/or a hearing aid device. Improved communication ability should positively contribute to socio-emotional well-being, and reduce the distress caused by the additional hearing disability in their management of their diabetic condition.
The limited evidence from other Low- and Middle-Income Countries indicates that people with T2DM are at additional risk of ear disease as well as permanent hearing loss. Due to their immunocompromised status, people with T2DM are at greater risk of developing potentially life-threatening ear disease, such as Chronic Suppurative Otitis Media (CSOM) which may lead to intracranial complications [30,31]. A study from India reported the presence of CSOM among almost half of their diabetic patients with hearing loss [32]. In a region of the world with already one of the highest rates of ear disease, a diagnosis of T2DM places a person in the Pacific Islands at additional risk of infectious co-morbidities [33].

1.2. Public health ENT/Audiology promotion for individuals with T2DM

The challenge for most of our Pacific Island neighbours is that ENT/Audiology services are limited or non-existent [34,35]. Where ear and hearing services cannot be adopted as described above, a public health ENT/Audiology promotion strategy is advocated [36]. Collaboration and integration with existing health promotion activities, such as those provided by the World Health Organization, is a time and cost-effective approach to ear and hearing health advocacy for Pacific Island countries. This approach should be implemented, even where ENT/Audiology services are available, to increase community awareness of

preventable hearing loss. Through collaboration with existing health promotion activities, ear and hearing health advocates will support current aimed at promoting positive behavioural changes that will impact both T2DM and all NCDs [36]. This should include promotion of traditional and locally available food, in preference to imported food products [38,39]. Health education activities to increase public health knowledge of hearing loss secondary to T2DM/NCDs may be conducted annually on World Hearing Day (3rd March) or World Diabetes Day (14th November).

4. Conclusion

Addressing the burden of T2DM and its complications is a major priority for the Pacific Islands. Although regional data would be beneficial to support ENT/Audiology programs into the routine care plan of people living with T2DM, their lack should not deter current efforts to implement pilot ENT/Audiology clinical and public health services. Where ENT/Audiology professionals are non-existent, ear and hearing health advocates may use public health platforms under the WHO or Sustainable Development Agenda to improve community awareness of hearing loss as an avoidable complication of T2DM in the Pacific Islands.

Abbreviations

CSOM	Chronic Suppurative Otitis Media
ENT	Ear, Nose & Throat
NCD	Non-Communicable Diseases
T2DM	Type 2 Diabetes Mellitus
TTM	Tupua Tamasese Meaole Hospital
WHO	World Health Organization

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