

SELF REPORTED HEARING LOSS AMONG ELDERLY MALAYSIANS

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ABSTRACT

A cross-sectional study was conducted on patients attending a primary care facility to determine the prevalence of self reported hearing loss using a single question, "Do you have hearing loss?" Pure tone audiometry was performed to compare the accuracy of the self report. A total of 111 patients were recruited. The prevalence of self reported hearing loss using a single question and pure tone audiometry was 24.3% and 36.9% respectively. By using pure tone audiometry at a cut-off-level of 25 dBHL (decibels Hearing level), the single question yielded a sensitivity of 41.4% and specificity of 85.0%. The single question performed better at 40 dBHL pure tone audiometry with sensitivity of 55.0% and specificity of 82.0%. In conclusion, the prevalence of hearing loss in elderly was high and the single question self reported hearing loss performed satisfactorily with moderate hearing loss.

Keywords: Elderly, hearing impairment, hearing loss, Malaysia.

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INTRODUCTION

Worldwide, there is an increase in the elderly population and this is expected to continue with better health care. In Malaysia, a similar trend is anticipated. The elderly population is expected to reach 3.8 million by year 2020 and they will constitute 11.3% of the total population.¹ This growth is expected to cause a rise in health problems related to the elderly. Commonly reported health problems among the elderly are visual problems (68%), difficulty with chewing food (48%) and hearing problems (16%).²

Exposures to noise, cardiovascular diseases, diabetes mellitus and hypercholesterolemia have been identified as risk factors for developing hearing impairment. The combined effects of aging and smoking have also been implicated.³ An earlier study done in Malaysia, showed increasing disability rates with advancing age, especially hearing and visual problems.^{2,4} Hearing loss is associated with distressing problems such as functional decline, anxieties, depression and social isolation. There is documented evidence to support that hearing loss is under diagnosed at primary care practice setting.⁵

The gold standard for the clinical evaluation of hearing loss is a formal audiogram.⁶ However, obtaining audiometric

assessment may be difficult due to limited referral facilities or reimbursement. Many simple screening tools for hearing loss are available and one of them is the self-administered questionnaire. These tools help physicians identify patients who would benefit from audiological or otolaryngological evaluation with potential hearing augmentation and eventually improve quality of life.

The aim of this study was to look at the prevalence of hearing loss using a single question, "Do you have hearing loss?" and to determine the accuracy of the single question compared to the gold standard pure tone audiometry (PTA). This study was done to evaluate whether a simple screening tool for hearing impairment is beneficial at the community level especially in places where audioscope services may not be available.

METHODS

A cross-sectional study was conducted in the year 2006, involving all patients aged 60 years and above. Study was conducted at a primary care facility in Muar district. Patients who agreed to participate in the study were first screened for dementia using the Elderly Cognitive Assessment Questionnaire (ECAQ). Patients who were confused, acutely

ill, demented or refused consent were excluded. Patients were then asked a single question, "Do you have hearing loss?" All these patients were then subjected to PTA at a nearby tertiary centre. Hearing loss was evaluated using the PTA measured at a threshold at 250, 500, 1000, 2000 and 4000 Hz. This research project received ethical approval from Research and Ethical Committee of Universiti Kebangsaan Malaysia.

Mean difference for continuous variable was compared using t-test. Statistical difference is set at $p < 0.05$.

RESULT

A total of 138 elderly patients were recruited for the study and 111 (80.4%) of them were evaluated using the single question and audiometry. The age range of the study subjects was 60 to 93 years with a mean of 68 ± 6.1 . There were 59 (53.2%) females and 52 (46.8%) males. Of the 111 patients, 27 (24.3%) reported positive hearing loss using a single question while 41 (36.9%) were detected to have hearing loss using PTA. Among those with hearing loss detected by PTA, 29 (26.1%) had mild hearing loss, 4 (3.6%) had moderate hearing loss, 6 (5.4%) had severe hearing loss and 2 (1.8%) had profound hearing loss. Normal hearing defined by PTA measurement is 10-25 dBHL, mild hearing loss at 26-40 dBHL, moderate hearing loss at 41-60 dBHL, severe hearing loss as 61-80 dBHL and profound hearing loss at 81 dBHL and above.⁷

The mean age of subjects with and without hearing loss evaluated by the single question was similar (mean age, 69.8 years vs. 68.0 years, $p = 0.193$). However, the mean age of subjects with hearing loss by audiometry was higher than those without hearing loss (mean age, 71.7 years vs. 66.3 years, $p < 0.001$). Among 27 (24.3%) who reported hearing loss using the single question, 17 (62.9%) had actual hearing loss measured by PTA. On the other hand, among the 84 subjects who reported no hearing loss, 24 (28.5%) of them had documented hearing loss by PTA.

Using PTA at a cut off level of 25 dBHL, the single screening question yielded a sensitivity of 41.4% and specificity of 85.0%. The positive predictive value (PPV) was 62.9% and negative predictive value (NPV) was 71.4%. These values were better when the cut off level for the PTA was increased from 25 dBHL to 40 dBHL (Table 1).

DISCUSSION

In this study, the single question "Do you have hearing problem?" gave a prevalence of 24.3%. Another almost similar single question, "Do you think you have hearing problem?" used by Wu HY *et al.* in Singapore Polyclinics, had yielded a higher 47.6% elderly reporting to have hearing loss.⁸ Sindhusake *et al.* in the Blue Mountain Hearing Study identified only 11.4% elderly who reported hearing loss using a single question "Do you think you have a hearing loss".⁹ These results could reflect the subjective rating of hearing loss when using single questions with ambiguous words such as "think" or "feel" or "say that you have" which was used in earlier studies.

Likewise, the prevalence of hearing loss detected by PTA in this study was lower compared to earlier studies in Thailand and Singapore.^{10,11} The reported prevalence from these two countries were 52.4% and 83% respectively. The differences could be due to differences in type of population studied, sample size and the PTA definition used. However, the prevalence in this study was comparable with the Blue Mountain Hearing Study, where the prevalence of hearing loss in elderly was 39.4% among subjects aged 55-99 years.⁹ Younger age group included in the study may have contributed to a lower prevalence of hearing loss.

There was no significant statistical association between single a question and the mean age or gender of the elderly. This was comparable with the Blue Mountain Hearing Study where the single question was not affected by age or gender.⁹ Study done by Gates *et al.* showed, more men reported themselves to have hearing problem than women although the reason was not clear.¹² As expected, in this study, PTA detected significantly higher rates of hearing loss with advancing age. This is similar to an earlier study done locally.¹³ There was no significant difference with gender even though the prevalence of positive case was still higher in male (46.1%) as compared to female (34%). This finding was similar to a study by Tambs *et al.* in the Nord-Trondelag Hearing Loss Study.⁵

Comparing the prevalence of self reported and PTA with a cut off level of 25 dBHL, more individuals failed PTA (36.9%) than self reported hearing loss (24.3%). This means that although the elderly had a hearing impairment, they failed to report it. This finding was comparable to the study reported by Jupiter T *et al.* where only 10% reported hearing loss compared to

Table 1: Diagnostic performance of single question vs. audiometry at 2 different threshold levels

Self-reported hearing loss	Sensitivity	Specificity	PPV	NPV
>25 dBHL Mild hearing loss	41.4%	85.0%	62.9%	71.4%
>40 dBHL Moderate hearing loss	55.0%	82.0%	40.7%	89.0%

PPV: positive predictive value; NPV: negative predictive value

hearing loss detected with PTA (81%) at 25 dBHL.¹⁴ This may reflect the difference in attitudes toward the communication process and hearing loss among different communities. Hearing impairment may not be perceived as a handicap instead, accepted as normal aging process.

By administering a single question "Do you have hearing loss?", the sensitivity of the test, which is the proportion of elderly who reported hearing loss and who really had hearing loss by PTA at >25 dBHL, was only 41.4%. However, the specificity of the question was high where 85.0% of the elderly who reported no hearing loss indeed had normal hearing and did not require audiology referral. The PPV and NPV of the question were also high. The probability of the elderly indicating hearing loss with genuine underlying hearing loss (PPV) was 62.9% and the probability of elderly indicated no hearing loss and had normal hearing (NPV) was 71.4%. Nevertheless, for a good screening tool it should be sensitive enough to identify the elderly who actually has hearing impairment; the single question was not a good tool at mild hearing loss (at 25 dBHL). There is a risk of under referral of individuals who require audiology service.

The low sensitivity result with a high specificity value of this single question for hearing loss in this study is comparable with few other studies. In a study of 267 rural Iowa women, the reported sensitivity was 56% and specificity of 82%.¹⁵ Similar results was found in Singapore where the single question showed sensitivity of 58% and specificity of 91%.⁸ This difference in sensitivity and specificity values may be due to lack of insight or denial of hearing problem by the elderly in this study population. Other contributing factors could be due to the difference in sample size and local prevalence of hearing loss in these studies.

The single question yielded better results when the PTA cut off value was increase from 25 dBHL to 40 dBHL, giving a sensitivity of 55.0% and specificity of 82.0%. The elderly in this study reported themselves to have hearing problem when they have moderate hearing impairment (at 40dBHL). The higher NPV (89.0%) and lower PPV (40.7%) of hearing impairment at 40 dBHL compared to 25 dBHL could be partly explained by the lower prevalence rate found for moderate and marked hearing loss (10.8%). Another possible explanation for increased sensitivity and specificity at 40 dBHL is probably because the socially adequate hearing or serviceable hearing is around 40 dBHL. Serviceable hearing is defined using two criteria: 70% SDS / 30 dBHL PTA (the 70/30 rule) and 50% SDS / 50 dBHL PTA (the 50/50 rule). SDS is the speech discriminating score.¹⁶ However, the sensitivity and specificity of a tool is important especially if it is used as a screening process. Based on the results of this study, it is justifiable to say that the single question is more useful in detecting moderate hearing loss compared to mild hearing loss.

As this study was conducted at one health centre, the generalization of this result to the general population is guarded. This prevalence may not reflect the true prevalence of hearing loss among general elderly Malaysian population. Hence, these sensitivity and specificity values need to be interpreted with caution. In addition, this study did not control the confounding factor of previous noise exposure before the assessment which may affect the interpretation of results.

CONCLUSION

Overall, the prevalence of hearing loss in elderly was high (36.9%) using the PTA. The single question of self reported hearing loss in this study showed a lower result (24.3%) compared to the prevalence detected by the PTA. The self reported hearing loss using a single question "Do you have hearing loss?" was found to be a relatively good tool for detecting moderate hearing loss with a sensitive of 55.0% and specificity of 82.0%. A multicentre study with larger sample size would improve generalisability, reduce the risk of random error and will enable the application of these results to a wider population.

Based on the results of this study, few recommendations can be made. Elderly patients should be routinely asked about their perception of their hearing status. If the single question of self report hearing loss is positive, a further detailed history and examination is warranted to assess the hearing status of the elderly. This should ideally be complemented with feedback to the family members to improve communication and to prevent social withdrawal. Referral to the audiologist for assessment is recommended if necessary. If the elderly denies hearing problem using the single question of "Do you have hearing loss?", it may be worthwhile to question the family members for any signs of hearing problem in the patient. Such patients may be in denial or have lack of insight regarding their hearing problem. Public awareness for early detection of hearing impairment among the elderly is essential as appropriate management can improve quality of life.

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Yet more bad news for dietary supplements: folate and B vitamins B6 do not prevent age-related cognitive decline

Wald DS, Kasturiratne A, Simmonds M. Effect of folic acid, with or without other B vitamins, on cognitive decline: meta-analysis of randomized trials. *Am J Med*. 2010;123(6):522-7.

This is a meta-analysis of 9 placebo-controlled randomized trials of folic acid, with or without other B vitamins, on cognitive function. The synthesis of data indicates no effect of folic acid on the prevention of age-related cognitive decline within 3 years of the start of treatment. The lack of effect is consistent across different elements of cognitive function: memory, language, processing speed, and decision making.