

The quality of life in hearing impaired adolescents after hearing aid application

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SUMMARY

Hearing impairment in adolescents is a major public health problem. According to the World Health Organization (WHO) deafness and hearing impairment are common health problems throughout the world. Hearing impairment generally impairs emotional, social, communication and educational function. The aim of this study was to determine the correlation between duration of hearing aid use and improvements in the quality of life. The cross sectional study was conducted at Jalan Peel Primary Special School and Universiti Kebangsaan Malaysia Medical Center (UKMMC) from July 2010 until June 2011. A total of 21 students with hearing impairment involved in this study with mean age of 12.57 (10 to 19 years old). The subjects were divided into 2 groups: first-time hearing aid users and long standing hearing aid users. The hearing assessment was conducted in the first group and hearing aids were fitted. After 1 month hearing aid fitting, the questionnaires were distributed to both groups. Statistical analysis had showed no relation ($p>0.05$) between duration of hearing aid use and the improvement in the quality of life. However, regardless of the duration of hearing aid usage, there was improvement in the quality of life as shown by the scores of the questionnaires. In conclusion there was no significant relation between duration of hearing aid use and the improvement in the quality of life. Hearing aids were beneficial for hearing loss students regardless of the duration of the hearing aid usage.

KEY WORDS:

Adolescent; hearing impairment; hearing aid; quality of life; sensorineural hearing loss

INTRODUCTION

Hearing loss can be defined as the decreased ability to receive or process acoustic stimuli. There are three basic types of hearing loss: conductive hearing loss, sensorineural hearing loss and mixed hearing loss. Conductive hearing loss occurs when sound is not conducted efficiently through the outer and middle ears. Sensorineural hearing loss occurs when there is damage to the inner ear (cochlea) or to the nerve pathways from the inner ear (retrocochlear pathway of the acoustic nerve) to the brain. Mixed hearing loss is when sensorineural hearing loss occurs in combination with a conductive hearing loss. There may be damage in the outer or middle ear and the cochlea or auditory nerve.

Quality of life is an individual's perceived physical and mental well being and the societies. There are many factors which may contribute to a person's quality of life. A person's quality of life may be affected by increased dependence on others due to pain brought on by an illness¹. The purpose of creating a quality of life measure is to assess the physical, emotional, and social functions of hearing loss. The questionnaire on the quality of life with regard to physical health, mental health and functionality are the most important component of health surveillance. The service needs and intervention outcomes are gauged from these questionnaires. The most powerful predictor of mortality and morbidity is the self-assessed health status that demonstrated scientifically the impact of health on quality of life rather than limiting to medical findings by others.

The main objective was to determine the quality of life in hearing impaired adolescents after being fitted with hearing aids and to study the correlation between duration of hearing aid uses and score of each compartment of Quality Of Life (emotional, social and communication function) questionnaires. The main hypothesis of this study was the longer the duration of hearing aid application, the better the outcome of quality of life. To date, there is no research on the impact of duration of hearing aid application on the quality of life.

MATERIALS & METHODS

This cross-sectional study was conducted at Jalan Peel Primary Special School and Otorhinolaryngology Clinic, (UKMMC) between July 2010 to June 2011. The study was conducted according to the Declaration of Helsinki, and the study protocol was approved by the Research and Ethical Committee (FF-119-2011). This study also obtained permission from the Ministry of Special Education and Special Education Department.

This research used health related quality of life questionnaire (HRQOL) adapted from the journal Quality Of Life Measure for Adolescents and Children with Hearing Loss by Amy M. Streufert. The benefit of using the HRQOL questionnaire is that it allows us to rate the quality of life of individuals and make comparisons across illnesses. Twenty one students from Jalan Peel Primary Special School were involved in this study with the age group of 10 to 19 years old. The subjects were

This article was accepted: 29 March 2013

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divided into 2 groups: first time hearing aid users and long standing hearing aid users. Questionnaires were distributed to those who were already on hearing aids. Those who had never worn hearing aids were brought to UKMMC and hearing impairment was assessed by using pure tone audiometry (PTA) and tympanogram. Reconstruction of individual ear moulds done and subsequently the students had hearing aids fitted by our audiologist. Subjects wore hearing aids and were given questionnaires after wearing hearing aids for a total of one month. Data was analyzed using SPSS Version 19. A Fisher's Exact Test was used for data analysis and a value of $p < 0.05$ was considered significant.

RESULTS

There were 21 respondents; 10(47.6%) were female, while 11 (52.4%) were male. There were 3 respondents aged 10 years old and 11 years old respectively. Four respondents aged 12 years old, 5 respondents aged 13 years old, and 4 respondents aged 14 years old. Only 2 respondents were aged 16 years old. There were equal percentages of Malay and Chinese subjects (42.86 %) whereas 12.29 % subjects were Indian. Fourteen (66.7%) subjects wore hearing aids on the right side; while 2 (9.5%) subjects wore hearing aids on the left side. Five (23.8%) subjects wore bilateral hearing aids.

Figure 1 shows the hearing aid usage in the subjects: 41.8% of the subjects wore hearing aids for one month, 4 subjects wore them for 24 months, 2 subjects wore them for 6 months and 72 months and 1 subject wore for 12 months, 36 months, 48 months and 96 months respectively. The mean duration of hearing aid use was 21.57 months.

Statistical analysis showed no relationship ($p > 0.05$) between duration of hearing aid use and improvement in quality of life. The p values of emotional function ($p = 0.473$), social function ($p = 0.299$), communication function ($p = 0.213$) and educational wise ($p = 0.720$) were demonstrated using Wilcoxon Rank Sum Test (Table I). Median scores of each function of quality of life parameter were higher in long standing hearing aid users compared to newly fitted hearing aid users (Table II and III).

Fourteen (66.7 %) subjects felt that the hearing loss annoyed them while 33.3% felt that the hearing loss did not annoy them. 52.4 % of the subjects claimed they did not have any problems in communicating with their friends while 47.6 % had problems interacting with their friends. Majority of the subjects showed good emotional function after hearing aid use. Although there were subjects that scored poorly, this might be due to poor maintenance of the hearing aids (i.e. no battery, dysfunctional hearing aid) and lack of acclimatization process as well as short duration of wearing hearing in a day (less than 8 hours) .

Twelve of the subjects had good communication function after hearing aid use regardless of the duration of hearing aid use. Although there were subjects that scored poorly, this may have been due to poor maintenance of the hearing aids (i.e. no battery, dysfunctional hearing aid) and short acclimatization process as well as short duration of wearing hearing aids in a day (less than 8 hours). Besides, most of the

subjects had already adapted to using sign language. Majority of the subjects showed good communication, social and education function after hearing aid use.

DISCUSSION

Referring to WHO's estimate in year 2001, 250 million people in the world have disabling hearing impairment of moderate or worse nature. Meanwhile, according to the 7th Asean and Japan High Level Officials Meeting on Caring Societies in 2005, the prevalence of hearing impairment in Malaysia is 17.14% and hearing disability is 4.97% in adults and 2.83% in children below 15 years. Fellingner *et al* (2008) studied the mental health and quality of life measures of deaf and hard-of-hearing students from Upper Austria with the Strengths and Difficulties questionnaire and the Inventory for the assessment of the Quality of Life in children and adolescents (ILC) and found that deaf children tended to have lower scores of HRQOL than the normative sample².

Questions regarding the duration of hearing aid benefit are of considerable interest to researchers conducting hearing aid studies. From this study, it was hypothesized that the longer the duration of hearing aids use, the better the quality of life outcome. If good result scores do occur significantly over time, action should be taken to provide hearing aids as soon as possible to hearing impaired people, especially adolescents.

Based on this study, it was shown that there was no relationship between duration of wearing hearing aids with the emotional, social, education and communication function in hearing impaired adolescents. Most of the deaf people in Malaysia or Asia today are under-educated with low status jobs and low levels of income. This study showed that there was a good score in educational function after hearing aid application. Therefore, it is clearly proven that hearing aids can result in good educational function of deaf people and thus, better quality of life in the future. With the usage of hearing aids, deaf people will have the potential to become a member of the mainstream workforce and get better jobs and a higher level of income. The negative factors which may potentially contribute to hearing impaired individual's self esteem are inadequate maternal bonding, lack of appropriate role models, poor paternal communication skills, feeling of mistrust due to a sense of inequality and negative attitudes towards hearing impaired people, social isolation, negative body image, lack of strong cultural identity, poor acquisition of American Sign Language (ASL) skills and rejection from family members and society in general³⁻⁶. Cultural values and norms as well as self-image and identity are often the major connection to one's experiences within the family.

Nearly half of our subjects had problems when interacting with friends because of their hearing. This proved that their communication function was affected due to hearing impairment. A child with hearing loss has difficulty perceiving and understanding speech sounds. Therefore, children with hearing impairment require intervention such as speech therapy after hearing aid application and consideration of the need for a hearing aid at an early age.

Table I: The association between duration of hearing aid use and improvement in quality of life using Wilcoxon Rank Sum Test

	Emotional Function Score	Social Function Score	Communication Function Score	Education Function Score	Total Score
Wilcoxon W	89.000	84.500	81.500	94.000	82.500
P Value	0.473	0.299	0.213	0.720	0.241

Table II: Health related quality of life (HRQOL) scores for long standing hearing aid users

	Emotional Function Score	Social Function Score	Communication Function Score	Education Function Score	Total Score
Mean	21.83	48.83	35.92	30.67	137.25
Median	25.00	46.00	37.00	30.50	138.00
Std. Deviation	6.576	11.991	5.823	3.172	20.662
Minimum	7	34	23	24	99
Maximum	27	67	42	35	163

Table III: Health related quality of life (HRQOL) scores in newly fitted hearing aid users

	Emotional Function Score	Social Function Score	Communication Function Score	Education Function Score	Total Score
Mean	20.89	43.33	33.11	26.00	127.33
Median	23.00	39.00	33.00	30.00	130.00
Std. Deviation	5.510	11.790	7.253	11.811	20.062
Minimum	11	31	19	0	87
Maximum	26	64	44	36	150

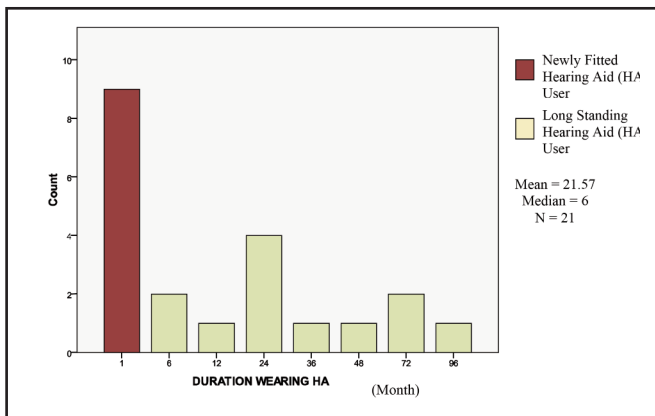


Fig. 1 : Distribution of subjects according to duration of hearing aid use.

Hearing loss may produce social isolation, poor communication skills and in some cases, it can affect mental health and quality of life. Therefore we would like to emphasize that all children who are diagnosed with hearing loss should be fitted with hearing aids as soon after diagnosis.

Malaysian Hearing Aid Program or National Hearing Aid Program would be a good start, since more and more babies are diagnosed with hearing loss but are delayed in getting hearing aid intervention. Furthermore many hospitals already have their hearing screening program. Problems in getting hearing aid fitting indirectly cause our cochlear implant candidates to receive their implants at the age 3-4 years or sometimes more than 4 years compare to Western Countries whereby the age of implant is less than 2 years of age.

Apart from using hearing aids, follow up and maintenance of the hearing aid also play a role in ensuring better quality of life in hearing impaired adolescents. Hearing aids need to be cleaned regularly and users should change the battery appropriately. For optimum results, hearing aid users should wear the hearing aids for a minimum of 8 hours in a day. Since a young child may have difficulty in the everyday putting in and taking out of the aids, the initial encouragement to wear them should be supplied by parents and caregivers. Parents also play a role as they need to check their children’s hearing aids regularly as the hearing aids may be dysfunctional after long term use. Other factors may also affect the quality of life after hearing aid users such as non compliance to hearing aids.

The factors of noncompliance to hearing aids are demographic (age and gender), psychological factors (stigma, cosmetic factor, patient’s feeling-children, and parental factor), social background (occupation, lifestyle and education) and hearing aid factors (cost, technical difficulties and knowledge). Despite the modernization of the technology these days, a survey over 300 potential adult hearing aid users found out that over 25% regarded even the behind the ear aid as too obvious and “cosmetically unacceptable”⁷.

Children’s perception of hearing aids may change as the children get older. As they reach adolescence, they become more aware of their appearance and develop a desire to conform to their peer group. The studies in America found that children react negatively to peers who wear visible hearing aids and that the larger the aid the more negative the reaction⁸. Therefore, hearing impaired adolescents should be given hearing aids as early as possible to improve their quality of life.

Based on the Revised American Academy of Otolaryngology-Head & Neck Surgery (AAO-HNS), this 5-minute hearing test can help determine whether you should be evaluated and treated for hearing loss⁹. Audiologists and other healthcare professionals' must educate the public on the importance of hearing checks. It is baffling that hearing sensitivity is still overlooked by most physicians despite published evidence that hearing loss decreases quality of life and adversely affects communication¹⁰. The HEAR-QL Quality of Life Questionnaire for Children with Hearing Loss which has been shown to be a valid, reliable and sensitive questionnaire and is better able to distinguish between children with and without hearing loss and can help evaluate interventions for children with hearing loss¹¹.

The limitation of this study was in terms of the duration of hearing aid use. This study only gave one month for the new hearing aid users which is considered short period of time. According to Arlinger *et al*, auditory acclimatization is defined as a systematic change in auditory performance with time, linked to a change in the acoustic information available to the listener¹².

CONCLUSIONS

There was no significant relation between duration of hearing aid use and the improvement in the quality of life. Hearing aids were beneficial for hearing loss students regardless of the duration of the hearing aid usage based on the questionnaires score.

ACKNOWLEDGEMENTS

We would like to thank Perfect ENT Hearing and Speech Centre Sdn. Bhd., Innovative Hearing Sdn. Bhd., Hearing Solution Company Sdn. Bhd. and Gnosis Audiology Sdn. Bhd. for sponsoring the hearing aids for this research. Our thanks also go to staff working at Jalan Peel Special Primary School and students who took part in our research. We also would like to declare that there was no conflict interest with the companies that sponsored the hearing aid.

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Appendix 1

Hearing Related QOL Measurement for Adolescents Soal Selidik Kualiti Hidup untuk Remaja

Instructions:

The purpose of this scale is to find how your hearing is affecting you. Answer YES, SOMETIMES, or NO for each question. If you use a hearing aid, please answer the way you hear with the hearing aid.

Arahan:

Tujuan soal selidik ini adalah untuk mengetahui bagaimana masalah pendengaran anda menjejaskan kehidupan anda. Jawab Ya, Kadang-kadang atau Tidak untuk setiap soalan. Sekiranya anda menggunakan alat pendengaran, sila jawab berdasarkan pengalaman anda mendengar dengan menggunakan alat pendengaran.

Check the appropriate boxes

- I wear ONE hearing aid (circle LEFT or RIGHT)
- I wear TWO hearing aids
- I use FM system in class

If you are wearing hearing aid(s), please state the period : _____

AGE:

GENDER: MALE / FEMALE (circle)

Sila tandakan dalam petak yang sesuai:

- Saya menggunakan alat pendengaran untuk 1 belah sahaja (bulatkan KIRI atau KANAN)
- Saya menggunakan alat pendengaran untuk kedua-dua belah
- Saya menggunakan isyarat tangan di dalam kelas

Sekiranya anda sedang menggunakan alat bantu pendengaran, sila nyatakan tempoh penggunaan : _____

UMUR:

JANTINA: LELAKI / PEREMPUAN (bulatkan)

Instruction:

Please mark (/) at the column provided for:

1. Strongly disagree
2. Disagree
3. Not sure
4. Agree
5. Strongly agree

Arahan:

Sila tandakan (/) di ruang yang berkenaan untuk:

1. Sangat tidak setuju
2. Tidak setuju
3. Tidak pasti
4. Setuju
5. Sangat setuju

Questions/Soalan	1	2	3	4	5
EMOTIONAL					
1. Does your hearing loss make you feel different from everyone else? <i>Adakah masalah pendengaran menyebabkan kamu berasa kamu berbeza daripada orang lain?</i>					
2. Does your hearing loss annoy you? <i>Adakah masalah pendengaran anda mengganggu anda?</i>					
3. Does your hearing cause you to be nervous? <i>Adakah masalah pendengaran anda menyebabkan anda berasa gemuruh?</i>					
4. Do you have problems with your hearing that make you angry? <i>Adakah masalah pendengaran anda menyebabkan anda marah?</i>					
5. Do you worry about your hearing loss getting worse? <i>Adakah anda bimbang masalah pendengaran anda semakin teruk?</i>					
6. Do you think that others talk about you behind your back? <i>Adakah anda rasa anda dikritik tanpa pengetahuan anda?</i>					
7. Do you get frustrated when you respond incorrectly to a statement or question? <i>Adakah anda rasa tertekan apabila anda memberi respon yang salah terhadap sesuatu kenyataan atau soalan?</i>					
SOCIAL					
8. Do you feel shy when meeting new people because of your hearing? <i>Adakah kamu berasa malu apabila berjumpa kenalan baru disebabkan masalah pendengaran anda?</i>					
9. Do you have problems at a pool or the beach because of your hearing? <i>Adakah anda mempunyai masalah apabila berada di kolam renang atau kawasan pantai disebabkan masalah pendengaran?</i>					
10. Do you have trouble with movies or TV because of your hearing? <i>Adakah kamu mempunyai masalah apabila menonton television disebabkan oleh masalah pendengaran?</i>					
11. Do you to have problems with family members because of your hearing? <i>Adakah kamu mempunyai masalah dengan ahli keluarga anda disebabkan oleh masalah pendengaran anda?</i>					
12. Do you not play with certain people outside of school because of your hearing? <i>Adakah anda tidak keluar bermain disebabkan oleh masalah pendengaran?</i>					
13. Does your hearing cause you to use an earphone or listen to music less than you would like? <i>Adakah masalah pendengaran anda menyebabkan anda kurang menggunakan 'earphone' dan mendengar muzik?</i>					
14. Do you feel left out when you are with a group of people because of your hearing? <i>Adakah anda rasa dipinggirkan ketika anda berada dalam kumpulan disebabkan masalah pendengaran?</i>					
15. Do your parents not let you do certain things because of your hearing? <i>Adakah ibu bapa tidak membenarkan anda untuk melakukan sesuatu aktiviti disebabkan oleh masalah pendengaran?</i>					

16. Do you have a hard time when meeting new people because of your hearing? <i>Adakah anda mengalami kesukaran ketika bertemu dengan kenalan baru disebabkan oleh masalah pendengaran?</i>					
17. Do you go to parties less than you would like because of your hearing? <i>Adakah kamu kurang pergi ke jamuan disebabkan oleh masalah pendengaran?</i>					
18. Do you go to movies less than you would like because of your hearing? <i>Adakah kamu kurang menonton tayangan video disebabkan oleh masalah masalah pendengaran?</i>					
COMMUNICATION					
19. Do you talk on the phone less because of your hearing? <i>Adakah kamu kurang menggunakan telefon kerana masalah pendengaran?</i>					
20. Do you to get annoyed when talking to members of your family because of your hearing? <i>Adakah anda merasa terganggu apabila bercakap dengan ahli keluarga anda disebabkan oleh masalah pendengaran?</i>					
21. Do you have trouble hearing when someone whispers to you? <i>Adakah kamu mempunyai masalah apabila seseorang berbisik pada kamu?</i>					
22. Do you have problems when interacting with friends because of your hearing? <i>Adakah anda mempunyai masalah apabila bercakap dengan kawan anda disebabkan oleh masalah pendengaran?</i>					
23. Do you to interact with friends less than you would like because of your hearing? <i>Adakah kamu kurang bercakap bersama rakan anda disebabkan oleh masalah pendengaran?</i>					
24. Do you have problems when interacting with family (parents, brothers, sisters) because of your hearing? <i>Adakah kamu mempunyai masalah apabila bercakap dengan ahli keluarga anda disebabkan masalah pendengaran anda?</i>					
25. Do you to interact with family (parents, brothers, sisters) less than you would like because of your hearing? <i>Adakah kamu kurang bercakap dengan ahli keluarga anda disebabkan masalah pendengaran anda?</i>					
26. Do you have problems at restaurants because of your hearing? <i>Adakah kamu mempunyai masalah di restoran disebabkan masalah pendengaran anda?</i>					
27. Do you interact with fewer people because of your hearing? <i>Adakah anda kurang bercakap dengan individu lain disebabkan oleh masalah pendengaran?</i>					
28. Does your hearing cause you problems when in the cafeteria (lunch room) with your friends? <i>Adakah masalah pendengaran anda menyebabkan kesukaran ketika anda berada di kafetaria bersama rakan-rakan?</i>					
29. Do you feel uncomfortable when talking to friends because of your hearing? <i>Adakah anda berasa kurang selesa semasa bercakap dengan rakan-rakan disebabkan oleh masalah pendengaran?</i>					
30. Do you think you have a harder time hearing than your friends in noisy places (restaurants, ball games, concerts, etc.)? <i>Adakah anda mengalami kesukaran mendengar di tempat yang bising berbanding rakan-rakan anda (eg: restaurant/konsert dll)?</i>					
31. Do you have a hard time hearing in the car? <i>Adakah anda mempunyai masalah pendengaran semasa berada di dalam kereta?</i>					

32. Do you have a hard time hearing your friends when outdoors? <i>Adakah anda mengalami masalah pendengaran ketika berada di luar bersama dengan rakan-rakan?</i>					
33. When you can't hear someone, do you have a hard time asking them to speak louder or repeat what they said? <i>Semasa anda tidak dapat mendengar suara seseorang, adakah anda mengalami saat-saat sukar untuk meminta mereka mengulang atau menguatkan suara?</i>					
34. Do you have a hard time learning people's names due to your hearing? <i>Adakah anda mengalami kesukaran untuk mengetahui nama orang lain disebabkan oleh masalah pendengaran?</i>					
35. Do you have problems when interacting with extended family (grandparents, aunts, uncles, cousins) because of your hearing? <i>Adakah anda mempunyai masalah apabila bercakap dengan ahli keluarga jauh disebabkan masalah pendengaran anda?</i>					
EDUCATIONAL					
36. Do you raise your hand or answer questions less in school because of your hearing? <i>Adakah anda kurang mengangkat tangan atau menjawab soalan-soalan di sekolah disebabkan oleh masalah pendengaran?</i>					
37. Does your hearing cause you problems in gym class (Physical Education, PE)? <i>Adakah anda mempunyai masalah apabila berada dalam kelas pendidikan jasmani?</i>					
38. Do you do participate less in sports or activities than your friends because of your hearing? <i>Adakah anda kurang menyertai sukan atau aktiviti berbanding rakan-rakan disebabkan oleh masalah pendengaran?</i>					
39. Do you have trouble hearing friends or coaches during sports due to your hearing? <i>Adakah anda mengalami masalah untuk mendengar suara rakan atau jurulatih semasa bersukan disebabkan oleh masalah pendengaran?</i>					
41. Do you pay attention less in class because of your hearing? <i>Adakah anda kurang memberi tumpuan semasa berada di dalam kelas disebabkan oleh masalah pendengaran?</i>					
42. Do you think you would do better in gym class (physical education, PE) if you could hear better? <i>Adakah anda merasakan bahawa anda dapat melakukan yang lebih baik di dalam kelas sukan sekiranya anda dapat mendengar dengan lebih baik?</i>					
43. When you can't hear a teacher or coach, do you have a hard time asking them to speak louder or repeat what they said? <i>Apabila kamu tidak mendengar arahan guru anda, adakah kamu mempunyai masalah untuk meminta mereka menguatkan suara atau mengulang apa yang mereka perkatakan?</i>					
44. Do you attend school social events less because of your hearing? <i>Adakah anda kurang menyertai aktiviti sosial sekolah disebabkan oleh masalah pendengaran?</i>					

Adapted from: Amy M. Streufert, B.S. Quality Of Life Measure For Adolescents and Children With Hearing Loss. 2010