

Original Article

Hearing Loss Related Quality of Life in Adolescents with Hearing Loss

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Objectives: Quality of life, when referring to an individual's health, is called health-related quality of life. The purpose of this study is to assess self-perceived hearing loss related quality of life of adolescents with hearing loss and its relationship with sex, age sub-groups or school settings with domains of quality of life.

Methods: A school based survey was conducted in Tehran city. Using stratified sampling, 255 7th to 12th grade students with hearing loss, aged 11-19 years, studying in main streaming and special school sitting, were participated in the study by completing the health-related quality of life adolescent's questionnaire. Physical, Emotional and Social health-related quality of life domain scores as well as Total health-related quality of life scores was calculated in a 0-100 scoring system.

Results: As a whole, health-related quality of life of adolescents calculated to be 64.7 ± 16.5 . Students with milder hearing loss reported their quality of life (physical, emotional and social domains, as well as total quality of life) better than those with more severe hearing loss. Girls reported their physical and total health-related quality of life better than boys, and adolescents who were studied in mainstreaming reported better physical, social and total health-related quality of life ($P < 0.05$). No significant differences were seen between reported health-related quality of life in early, mid or late adolescent age sub-groups. Nevertheless the power of tests was not enough to exclude differences between groups.

Discussion: Findings of this study could be readily used to focus interventions on domains with more weakness in each group of adolescents. Beyond that the results could be helpful as a base line for detecting effectiveness of interventions in future.

Keywords: Quality of Life, health-related quality of life, hearing impaired, adolescent

Submitted: 17 December 2014

Accepted: 24 February 2015

Introduction

Hearing impairment is the most frequent sensory deficit in human populations, affecting more than 250 million people in the world (1). More than 1000 babies are born with some form of hearing impairment in Iran each year (2). Sensorineural hearing loss is a chronic condition for which medical or surgical treatment is not commonly available. However, rehabilitation and voice amplification through hearing aids and/or other assistive devices is possible (3). Consequences of hearing impairment include inability to interpret speech sounds, often producing a reduced ability to communicate, delay in language acquisition, economic and educational disadvantage, social isolation and stigmatization,

and decreasing quality of life (1). Adolescence is a life stage with rapid and major developmental changes in physical, emotional, cognitive, and social aspects, yet little is known about how these changes influence the quality of life of young people who are deaf or hard-of-hearing (4). Quality of Life could be affected in children and adolescents with hearing loss because of the importance of communication and social participation in daily life (4). The goal of intervention is to improve the individual's communication and auditory perception as well as minimize restrictions brought on by the hearing loss, and increase the individual's well-being or quality of life (3). One of the indicators for measuring outcomes of health care programs is increased

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quality of life for services receivers (5). Measuring how youth who are deaf or hard-of-hearing (DHH) feel about their quality of life (QOL) can provide children, parents, and clinicians with important information that can help guide individual and social choices to optimize subjective well-being (4).

Quality of life, when referring to an individual's health, is called health-related quality of life (HRQL) (6). Health-related quality of life refers to people's subjective evaluations of the influences of their current health status, health care, and health promoting activities on their ability to achieve and maintain a level of overall functioning that allows them to pursue valued life goals and that is reflected in their general well-being (7). HRQL focuses on patients' perceptions of their disease and measures impairments that have significant impact on the patient. Similar symptoms may vary in their effect on different individuals; the goal of therapy should be to reduce impairments that patients consider important (6), enhance participation, increase sense of wellbeing and satisfaction from live. Quality of lives of adolescents with hearing loss has not been investigated until recent years. Since then a few studies have been reported. For example Skrbic, et al. (2011) studied the impact of hearing impairment on quality of life of Serbian adolescents, with the PedsQL 4.0 Generic Core Scale. They found that hearing loss affects all aspects of the quality of life of adolescent and suggested that a multidisciplinary approach is required to reach a better function and quality of life (8). Hintermair (2010), has studied quality of life of 212 mainstreamed hearing-impaired children and compared it with normally hearing children in Germany using Inventory of Life Quality of Children and Youth (ILC) for the measurement. No significant difference was found between students with hearing impairment and normally hearing peers. However some significant relations were found between quality of life scores and communicative competence, intelligence, academic achievements, and participation (9). Andrea, et al, (2009) assessed quality of life of 50 pre-school children with hearing impairment using cochlear implant in United States. They used 'kiddy-kindie measure' for this purpose. Both of the children and their parents were asked to answer the questionnaires. They found that although preschool children using cochlear implants could assess adequately their own QOL, but parents afford valuable complementary perspective on the child's socio-emotional and physical wellbeing. Preschool

children using cochlear implants rate overall QOL measures similar to hearing peers (10). Maria Huber (2009), survey Health-related quality of life of 65 Austrian children and adolescents with cochlear implants, 8-16 ages, with the KINDLR, a generic instrument for health-related quality of life (HRQOL) of children and adolescents. The HRQOL total score of the children with CI ($n=18$), age 8-12 was below the standard for hearing children ($P<0.001$). It differed from the total score of the parent rating ($P<0.0001$). The total score of the adolescents ($n=11$), age 13-16 was within the norm, with no significant difference between adolescent and parents' ratings. The total scores correlate with outcomes of audiological speech tests, length of time of deafness, and age at implantation. Children with cochlear implant experienced a lower health-related quality of life, compared to hearing children, with a low parent-child agreement (11). Wake et.al (2004), studied the parent-reported health-related quality of life in 7 -8 year-old children with congenital hearing loss in Australia, by 28-item parent-proxy Child Health Questionnaire measure of HRQOL. They demonstrated that HRQOL was poorer in people with less severe hearing loss, and differences in hearing loss severity accounting for 10% and 11% of variance in the Physical and Psychosocial Summary scores, respectively. Age at diagnosis did not contribute significantly to the Summary scores (12). There were no reports on QOL of adolescent with hearing loss in Iran. So we decided to study current situation of HRQOL of adolescents with hearing impairment in Iran, which we hope to help in further planning on health and education of this group of young people.

Methods

In a cross-sectional study, 255 students with hearing impairment (12-18 years old) who were studied in secondary and high schools in 2011 in Tehran city were selected. Including criteria were: having hearing loss with a severity of more than 25 dBHL on better ear on the audiogram, being a student of regular or exceptional school, and the only excluding criterion was refusing to participate in the study. Based on records of the 'Children with special needs education organization', a total number of 7 secondary and high special schools for student with hearing impairment (4 schools for female, 3 schools for male) were existed in Tehran city; in which 485 students (217 female and 268 male) were studied. At the same time there were 235 other students with

hearing impairment (139 female and 96 male) who were studied on those grades in regular schools. The selected students completed the Hearing Loss Related Quality of Life (HL-R-QL) questionnaire. Quality of life was measured with Hearing Loss Related Quality of Life questionnaire (13). This questionnaire is in Persian language and has been developed to measure hearing loss related quality of life of adolescents with hearing impairment. It measure's hearing loss related quality of life in three domains of physical (8 items), social (13 items) and emotional quality of life (17 items). The questionnaire has a 0 to 100 scoring system in measuring scores of each domain and HL-R-QOL as a whole, in which the higher scores indicated better quality of life. Internal correlation coefficient of the questionnaire by Cronbach's α coefficient has been reported to be 0.89. Its content validity index using Lawasche Method has been reported to be 0.79 and

the Correlation coefficient for test-retest reliability at a 2 weeks interval was 0.85. Mean and standard deviation values of HL-R-QOL total score and domain scores were calculated for all participants as a whole group as well as for students with different sexes, hearing loss severities and, for students who were studied in different school settings. Differences of HL-R-QOL between students studying in different school setting, with different sex, age group and hearing loss severity were assessed using multivariate general model. Effect size of each variable was assessed by eta square.

Results

Characteristics of adolescent with hearing impairment who were studying in special schools and regular schools (mainstreaming) can be seen in table (1).

Table 1. Characteristic of adolescent with hearing impairment in different school settings

Adolescent characteristics		School setting	
		Regular school	Special school
Age group	Early adolescent (11-13)	33 (42.3%)	12 (6.8%)
	Middle adolescent (14-16)	36 (46.2%)	59 (33.3%)
	Late adolescent (17-18)	9 (11.5%)	106 (59.9%)
Degree of Hearing loss	Mild (<40db)	14 (17.9%)	6 (3.6%)
	Moderate (41-55db)	27 (34.6%)	13 (7.6%)
	Severe (56-70db)	16 (20.5%)	37 (20.9%)
	Profound (71-90db)	21 (26.9%)	120 (67.9%)
Sex	Female	37 (47.4%)	88 (49.7%)
	Male	41 (52.6%)	89 (50.3%)

As indicated in table (1), the number of adolescent with profound hearing loss (120 students) and the number of students in late adolescent ages (106 students) who were studying in special schools were much higher than those in regular schools (21 and 9 respectively). Table (2) shows the HL-R-QOL scores of students in regular and special school

settings. It can be seen that, except for emotional QOL mainstreamed students obtained higher scores in other domains of HL-R-QOL and total HL-R-QOL than those in special schools ($P<0.05$). Also it can be seen that HL-R-QOL scores for the whole group of the student with hearing impairment was estimated to be 64.70 ± 1.6 .

Table 2. HL-R-QOL of Adolescent with hearing loss studying in Regular and special school settings

School setting	Regular school	Special school	Total	P-Value	Eta (eta ²)
	Mean±SD	Mean±SD	Mean±SD		
HL-R- QOL Score					
Physical *	72.67±2.03	58.61±2.4	62.91±2.37	0.000	0.237 (0.074)
Emotional	71.60±1.9	66.91±1.72	68.35±1.8	0.055	-
Social	66.27±2	58.73±1.8	61.04±1.9	0.003	0.183 (0.034)
Total Score	70±1.7	62.36±1.6	64.70±1.6	0.001	0.213 (0.045)

Table (4) demonstrated the Hearing-loss related QOL scores in terms of sex. The results showed that, girls reported their HL-R-QOL significantly better than boys (0.01), and a closer look to the table,

reveals that there is a significant difference between girls and boys in reported physical HL-R-QOL scores. ($P=0.008$).

Table 3. Hearing-loss related QOL of Adolescent with hearing loss in terms of sex

Sex HL-R- QOL Score	Female	Male	Total	P-Value	Eta (eta ²)
	Mean±SD	Mean±SD	Mean±SD		
Physical Score*	67.05±22.5	58.94±24.4	62.91±23.8	0.008*	0.171(0.29)
Emotional Score	70.47±18.3	66.31±17.6	68.35±18.0	0.065	-
Social Score	63.23±19.5	58.93±18.2	61.04±19.0	0.071	-
Total Score	67.27±17.0	62.23±15.8	64.70±16.6	0.015	0.152 (0.23)

T test was used for comparisons except for physical scores in which the distribution of data was not normal and the Mann-Witney U test was used for comparison

Table (5) shows, the Hearing-loss related QOL was no significant difference between these 3 age scores in terms of age group. As is observable, there groups.

Table 4. Hearing-loss related QOL of students with hearing loss in different adolescent age groups

Age Group HL-R- QOL Score	Early adolescent	Middle adolescent	Late Adolescent	Total	P-Value
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	
Physical	63.88±26.4	66.31±23.7	59.72±22.6	62.92±23.8	0.130
Emotional	72.54±18.4	69.54±19.0	65.72±16.8	68.35±18.0	0.071
Social	63.33±20.2	63.12±18.8	58.42±18.5	61.97±15.7	0.137
Total Score	67.57±17.2	66.66±16.9	61.96±1.6	64.70±16.6	0.054

Table (6) shows the HL-R-QOL scores in terms of different in students with hearing loss of different hearing loss severity. The total score and scores of severity ($P<0.05$). each of the three domains of QOL are significantly

Table 5. QOL of Adolescent with hearing loss of different Severity

Severity HL-R-QOL Score	Mild 40 db and less	Moderate 41 db to 55 db	Severe 56 db -70db	Profound 71 db-90 db and more	Total	P-Value	Eta (eta ²)
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD		
Physical *	80±15.0	75.78±18.6	64.62±22.8	56.25±23.9	62.94±23.8	0.000	0.362 (0.131)
Emotional	73.23±16.4	73.38±17.4	63.15±21.5	68.31±16.5	68.42±18.0	0.028	0.189 (0.036)
Social	74.42±17.1	67.98±18.4	59.36±20.3	57.91±17.7	61.09±19.0	0.000	0.278 (0.077)
Total Score	75.06±13.9	72.03±15.9	62.16±18.5	62.21±15.3	64.76±16.6	0.000	0.282 (0.079)

As is observed, QOL scores are negatively related to have significant differences with each other by post with severity of hearing loss. Sub groups who showed hoc analysis are demonstrated in table (7).

Table 6. Comparison of HL-R-QOL scores post hoc analysis QOL of Adolescent with hearing loss of different Severity

Compared groups		Tukey's post hoc test
Physical	Mild- Sever	0.046
	Mild-Profound	0.000
	Moderate-Profound	0.000
Emotional	Mod-Sever	0.033
	Mild-Sever	0.011
	Mild-Profound	0.001
Social	Moderate-Profound	0.013
	Mild-Sever	0.012
	Mild-Profound	0.005
Total Score	Moderate-Sever	0.018
	Moderate-Profound	0.004

** only those groups with significant difference in QOL are shown at the table*

Discussion

Self-reported hearing loss related quality of life of adolescents with hearing loss estimated to be 64.7 ± 16.5 , in Tehran city by using HL-R-QOL questionnaire, which has a 0-100 scoring system. More Severe hearing loss was accompanied by lower scores in all 3 domains of HL- R-QOL, as well as total score. Dayna, et al (2003) who were studied elder people with hearing loss in USA also reported that severity of hearing loss was associated with reduced quality of life scores (14), but ; Lotfi found no relationship between severity of hearing loss and Quality of life in elder people in Iran (15). In a study Wake et.al (2004) were used parental reports to study HR QOL of 7-8 old children with congenital hearing loss in Australia, in which they observed a negative relation between parental report of HRQOL and severity of hearing loss (12). However in their study they did not use hearing loss specific questionnaire and no information were gathered from the children themselves. In a study of disease specific health related quality of life in adolescent age group, Katia,et al(2009)found that adolescents with more severe asthma reported their QOL lower than those with milder asthma in Brazil (16). In our study adolescents in different age sub-groups were not significantly different in self-reported H-L R QOL total scores or domain scores. Jeffrey,et .al, who were studying children and adolescents 5-18 years of old with obesity also have found no relation between age and HRQol (17), while in some other studies on health related quality of life of adolescents the results showed that people in early adolescent age group rate their health related QOL better than adolescents with higher ages; for example in India Awasthi, et al found that in general population, early adolescents reported their health related quality of life higher than older adolescents (18), and in Brazil Torres, et al, (2013) found that in adolescents (10-19 years old) with hearing loss and those with vision loss reported physical quality of life were better in early adolescents (19), and similarly in Taiwan Lin, et al , found that in adolescents with physical disability higher ages were related to worse self-reported health related quality of lives (20).

In the present study students in regular schools rated their physical and social H-L R QOL significantly better than those in special schools, in concordance with results of Torres, et al (2013) study on adolescents with hearing loss or vision loss in Brazil, 10-19 years, who found that psychological & social

health related quality of life of those who studied in integrated schools were better in integrated schools (19); Schick, et al, (2012) who found that there were only few difference between self-report health related quality of life in adolescents with hearing loss in different school setting, domains of QOL were completely different from those we studied (21), but Lin, et al's study (2009) on health related quality of life of adolescents with physical disability in Taiwan showed no difference in QOL of adolescents who were studied in special or mainstream settings (20). In this study girls reported significantly better physical and total H-L R; in contrast to results of study of Lin, et al on (2009) quality of life of adolescents with physical disability in which girls reported worse quality of life in some subdomains QOL. Alvim, et al demonstrated Brazil asthma, Jeffrey, et .al and Katia, et al did not found any sex difference in HR QOL of adolescents with obesity or asthma disease respectively (16, 17, 22)and also Lotfi did not found any difference between men and women health related quality of life of elder people with hearing loss (15).

An important feature of the present study which makes it different from other studies in this area is the use of Hearing loss specific questionnaire for measurement, which precisely reflect aspects of problems in hearing loss, as a consequent the results could be more helpful in suggesting areas to focus on to promote better quality of life in adolescents with hearing loss. Furthermore items of questionnaire asked about various problems, which adolescents with hearing loss are faced with and compromise their quality of life in physical social and emotional aspects, and detailed information which have gathered from individual questions would help further in design intervention program to improve quality of lives of this group of young people.

Conclusion

The study provides valuable information about present situation of HL-R-QOL of adolescents with hearing loss, which could use as a guide for planning interventional programs and a base line for measuring the effectiveness of various programs which aimed at offering better lives to people with hearing loss as a group of people with special needs.

Acknowledgment

The authors would like to thank all of the students with hearing impairment and their parents who participate in this study.

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