

OTOLOGY

Psychological profile and social behaviour of working adults with mild or moderate hearing loss

Il profilo psicologico e il comportamento sociale del soggetto adulto affetto da ipoacusia lieve o moderata

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SUMMARY

In this study, an assessment was made of the global assumption that working adults with a mild to moderate sensorineural hearing loss experience more negative emotional reactions and socio-situational limitations than subjects with no hearing problems and that a deterioration of health-related quality of life on these specific domains would occur. Comparisons between 73 hearing-impaired subjects and 96 controls, well-matched for socio-demographic variables, were performed using the HHIA, MOS 36-Item Short Form Health Survey (SF-36) and SFQ questionnaires scores and revealed that the former experience a higher level of perceived hearing handicap and a deterioration of health-related quality of life while investigating emotional and socio-situational domains than the latter ($p < 0.005$). While investigating the psychological distress dimension of the hearing-impaired subjects by means of the Symptom Check List (SCL-90-R), it emerged that they are more prone to depression, anxiety, interpersonal sensitivity, and hostility than subjects with no hearing problems ($p < 0.05$). It is argued that the sensory impairment, with its associated disability, may discourage hearing-impaired individuals from exposing themselves to socially challenging situations, producing isolation that leads to depression, irritability, feelings of inferiority. The same psychological symptoms, on the other hand, can compound and worsen the picture by influencing social behaviour of the affected persons. Further prospective studies are needed to address this issue. Nevertheless, it is concluded that Audiology Services, despite the time and costs involved, should improve their diagnostic ability by exploring more areas of hearing-impaired subjects concerns in order not to overlook their potentially reduced psychosocial well-being.

KEY WORDS: Hearing handicap • Social and role functioning • Anxiety • Depression • Mental Health • Presbycusis

RIASSUNTO

Questo studio è mirato a verificare l'ipotesi generale che una popolazione di adulti in età lavorativa e realmente occupati, affetti da una perdita uditiva di tipo neurosensoriale di grado lieve (26-40 db) o moderato (41-55 db), possano soffrire di reazioni emotive negative e di limitazioni socio-situazionali in modo più consistente se confrontati con un gruppo di controllo di normoudenti. Allo scopo sono stati reclutati 73 soggetti ipoacusici e 96 controlli sovrapponibili ai primi per caratteristiche socio-demografiche nell'ambito degli accertamenti audiometrici di routine delle Aziende Ospedaliere-Universitarie di Modena e Ferrara. Sono stati confrontati i risultati ottenuti dai due gruppi nei punteggi dei questionari ad hoc (Hearing Handicap Inventory for Adults, MOS 36-Item Short Form Health Survey, Social Functioning Questionnaire), dai quali si è evidenziato che i pazienti affetti da ipoacusia neurosensoriale percepiscono un maggior grado di handicap uditivo ed un peggioramento della qualità della vita nei domini specifici della sfera emotiva e del comportamento sociale rispetto ai normoudenti ($p < 0,005$). Nell'investigare la dimensione del distress psicologico grazie all'impiego del questionario Symptoms Check List 90-R, è emerso che gli ipoacusici hanno una maggiore tendenza alla depressione, all'ansia, alla sensibilità interpersonale e all'ostilità rispetto ai normoacusici ($p < 0,05$). È stato ipotizzato che l'indebolimento della funzione uditiva e la conseguente disabilità possano scoraggiare i soggetti affetti da deficit uditivo dall'esporsi a situazioni sociali impegnative e addivenire così ad una situazione di isolamento che di per sé può portare alla depressione, all'irritabilità e al sentimento di inferiorità; non è possibile comunque escludere che lo stesso distress psicologico, d'altra parte, possa giustificare e peggiorare il quadro del deficit neurosensoriale influenzando direttamente il comportamento sociale delle persone affette da ipoacusia. Ulteriori studi di tipo prospettico sono necessari per dirimere la questione in oggetto. Tuttavia questo studio indica con chiarezza che anche una presbiacusia in fase iniziale è meritevole di un inquadramento clinico multi-dimensionale ed è auspicabile che i servizi di audiologia aumentino le proprie capacità diagnostiche in questa direzione esplorando il maggior numero possibile degli aspetti legati al paziente ipoacusico allo scopo di non sottostimare le eventuali compromissioni del suo benessere psicosociale, a dispetto di un evitabile aumento dei costi e di una dilatazione del tempo-paziente impiegato.

PAROLE CHIAVE: Handicap uditivo • Funzionamento e ruolo sociale • Ansia • Depressione • Salute Mentale • Presbiacusia

Introduction

Hearing loss is a very common medical condition among adult populations of industrialized countries¹ and it is generally accepted that its impact on communication is largely related to a deterioration in quality of life (QoL)². As a result of maladaptive communication strategies, persons with hearing loss may perceive their social skills to be poor and experience a reduced self-esteem if a combination of hearing impairment and a poor coping strategy contributes to failure in their roles^{3,4}. A general tendency not to seek medical help⁵ and request hearing aids⁶ potentially lead hearing-impaired individuals to disability and handicap. Since these two terms are often confused, it might be useful to point out that, according to the conceptual framework provided by the International Classification of Impairment, Disabilities and Handicaps (ICIDH, 1980), disability refers to the inability to perform an activity and handicap indicates the disadvantage resulting from such a disability, respectively. In addition, it has been proved that a large percentage of primary care physicians do not routinely test for hearing impairment in adults. Therefore lack of referral to an audiological tertiary care centre is yet another reason for underestimating hearing loss and its consequences in areas such as personal relations, social integration and psychological well-being⁷.

To date, many studies have investigated the psychosocial consequences of hearing loss in the elderly⁸⁻²¹, who are held to be retired and to experience a limited social life, in the majority of cases. As a confirmation of this trend, a recent study revealed that hearing loss has less effect on mental health and subjective well-being among older people (65+ years) than middle-aged (44-65) and younger people (20-44)²². In contrast, attempts to assess the psychosocial attitudes where acquired hearing loss afflicts younger individuals have been more rare^{23,24} or limited to heterogeneous samples including signing deaf or subjects with profound hearing loss²⁵⁻²⁸ where more than one confounding factor (congenitally vs. acquired deafness, aided and unaided subjects, communication strategies) could bias results. An interesting Italian study focused on disability and handicap in young and middle-age patients (18-65 years), but the sample included only individuals with noise-induced hearing loss with evident limitations in social and cultural variables²⁹. Some other important factors that may need to be controlled for in the evaluation of hearing impairment of mental health and social behaviour are the employment conditions³⁰, noise-induced hearing loss³¹, the association of hearing loss with chronic tinnitus³² and vestibular involvement³³. Therefore, the overall purpose of the present research is to explore the psychological and social profiles in a selected sample of working adults (aged 35-55 years) affected by mild (< 40 dB) to moderate (41 to 55 dB) bilateral, sensorineural hearing loss due to presbycusis.

Material and methods

Subjects

A total of 73 subjects with hearing loss (HL), 35 males (48%), 38 females (52%), age range 35-54 years (mean = 46.0, SD = 9.1) were recruited in this study. The hearing-impaired subjects were all outpatients undergoing audiological evaluation at the University Hospitals of Modena

and Ferrara, Italy. The mean pure tone average (PTA), calculated over 0.5, 1, 2 and 4 kHz across both ears, hearing threshold ranged from 19.4 to 54.0 dB HL with a mean of 39.6 (SD = 7.6). Based on the better-ear PTA, 34 (46%) had a mild hearing loss (26-40 dB HL), 39 (54%) had a moderate loss (41-55 dB HL). All had typical audiograms ("sloping") with worsening hearing thresholds from the middle to the high frequencies, with differences within 10 dB for each tested frequency between the ears.

In accordance with the study design, subjects with fluctuating hearing loss, current hearing aid users, noise-induced hearing loss, chronic tinnitus and/or vertigo were not included in the investigation. Other exclusion criteria were: not understanding the Italian language and major medical disorders and/or handicap due to which the participants were unable to work regularly. A total of 96 subjects with a normal pure tones hearing threshold (PTA < 25 dB HL) (min = 5.5 dB, max = 25.0 dB, mean = 15.3 dB, SD = 3.7 dB), 46 males (48%) and 50 females (52%), age range 30-55 years (mean = 47.1, SD = 8.9) were selected on the basis of corresponding socio-demographic parameters and recruited during the screening audiometric evaluation of the general population, served as a control group (NH).

To provide a socio-demographic description of NH and HL groups, a preliminary χ^2 test was used to compare sex, occupational (professional vs. non-professional), social status (single vs. married or cohabiting). Age, duration of education (years) and PTA (dB HL) were compared by the independent t-test procedure. The results are outlined in Table I and clearly indicate that the two samples (NH and HL) do not differ as far as the variables considered are concerned (Table I).

The experimental protocol followed the recommendations of the Declaration of Helsinki for Human Experimentation and informed consent was obtained from each participant before assessment.

Instruments

The Hearing Handicap Inventory for Adults (HHIA)³⁴ was employed. This 25-item questionnaire is derived from the original Hearing Handicap Inventory for the Elderly (HHIE) by Ventry and Weinstein³⁵ and is composed of a 13-item emotional subscale and a 12-item socio-situational subscale. Two replacement questions from the HHIE focus on the occupational effects of hearing loss. A *yes* answer to an item is awarded 4 points, a *sometimes* 2 points and a *no* 0 points. Therefore, scores range from 0 to 100 points indicating an increasing level of perceived handicap.

This disease-specific questionnaire has been recently adapted to the Italian language by the Author of the present report³⁶ and it has been shown that it maintains the original validity and reliability.

To further investigate the psycho-sociological domains of health-related QoL, the Italian translation³⁷ of the MOS 36-Item Short Form Health Survey (SF-36) was used. The scale consists of 36 items subdivided into 8 health scales, i.e., general health (GH), physical functioning (PF), role-physical (RP), bodily pain (BP), vitality (V), social functioning (SF), role-emotional (RE) and mental health (MH). Each dimension is separately scored using item weighting and additive scaling. Summed data were then transformed into a 0 to 100-point scale, higher score indicating bet-

Table I. Socio-demographic characteristics and audiometric derived measure of hearing thresholds (PTA) of the two samples (NH and HL)

	NH (n = 96)	HL (n = 73)	Statistics	Df	p
Sex					
Male	46 (48.0%)	41 (48.0%)	$\chi^2 = 0.000$	1	0.997
Female	50 (52.0%)	53 (52.0%)			
Age (yrs)					
Mean (SD)	47.1 (8.9)	46.0 (9.1)	t = - 1.1	180	0.272
Education (yrs)					
Mean (SD)	12.1 (6.3)	11.2 (5.0)	t = 0.427	180	0.670
Occupation					
Professional	49 (51%)	37 (51%)	= 0.002	1	0.543
Non-professional	47 (49%)	36 (49%)			
Marital status					
Married or cohabiting	71 (74%)	54 (74%)	$\chi^2 = 0.78$	1	0.87
Single	25 (26%)	19 (26%)			
PTA (dB HL)					
Mean (SD)	15.5 (3.8)	39.6 (7.6)	t = - 29	201	< 0.000

ter. In the framework of this study, we employed the (SF) and the (RE) subscales. The first measures the impact of physical and emotional problems on social activities (with family, friends, neighbours and groups), while the second rates the interference of emotional problems (such as feeling depressed or anxious) with work and other regular daily activities.

Specifically, social behaviour was assessed with the Social Functioning Questionnaire³⁸, an eight-item self-rating scale (score range 0-24) covering the most important domains of social life, such as work, home activities, finance, social, family and sexual relationships and spare time activities.

The revised version of the Symptom Check List-90 (SCL-90-R), a valid and reliable psychiatric multidimensional self-report inventory³⁹, was the tool used to screen for psychopathological symptom pattern and level of distress in community and medical responders. The 9 primary symptom dimensions are labelled as follows: 1) somatization (SOM) that reflects distress arising from the perception of body dysfunction, 2) Obsessive-Compulsive (O-C) includes behaviours that are closely related to the clinical syndrome of the same name, 3) Interpersonal Sensitivity (INT) focuses on feelings of personal inadequacy and inferiority particularly in comparison with other individuals, 4) Depression (Dep) identifies signs of loss of interest in activities, lack of motivation, loss of vital energy and suicidal ideation, 5) Anxiety (Anx) includes general signs such as nervousness, tension and restlessness, 6) Hostility (Hos) reflects thoughts, feelings and actions of hostile behaviour, such as: annoyance, urges to break things and uncontrollable temper outbursts, 7) Phobic Anxiety (Phob) ranges fears of a phobic nature related to travelling, open spaces, crowds or public places and conveyances, 8) Paranoid Ideation (PI), and 9) Psychoticism (Psy). Each item of the questionnaire is rated, by the subject, on a five-point scale of distress from 0 (none) to 4 (extreme). The score of each scale is then transformed into percentile value. The global severity index (GSI) is used as a summary of the entire questionnaire.

Data analysis

The Wilcoxon test was computed to compare nonparametric variables, such as the total scores of the HHIA and of its socio/situational and emotional subscales, the subscales of the SF-36 (social functioning and role emotional), the SFQ score and SCL-90 subscales of NH and HL groups.

The statistically significant level was set at p value < 0.05 in all procedures.

The statistical Package SPSS/PC + version 14 was used.

Results

Significant differences in the scores of HHIA ($W = 4702$, $p < 0.005$), socio-situational ($W = 4754$, $p < 0.005$) and emotional ($W = 4700$, $p < 0.005$) subscales were found in HL subjects when compared to NH controls (Table II). The former presented much higher scores, both on the HHIA and its subscales, than the latter, thus showing an increased perception of hearing handicap in the emotional and socio/situational areas. Even more, patients scored significantly lower than controls both on the SF (social functioning) ($W = 5239$, $p < 0.005$) and RE (role-emotional) ($W = 5646$, $p < 0.005$) subscales of the SF-36 (Table II), confirming analogous results obtained by the HHIA questionnaire. Finally, hearing-impaired subjects scored significantly higher than the sample with no hearing problem on the SFQ ($W = 9692$, $p < 0.005$) (Table II).

Table III shows mean values and standard deviations of the NH and HI groups on psychopathological dimensions. The hearing-impaired group showed significantly higher levels of global psychological distress as shown by the GSI score and in the depression, anxiety, interpersonal sensitivity, and hostility subscales scores.

Discussion

Disability and psychological distress associated with acquired hearing loss have been traditionally described and

Table II. Scores of the HHIA and its subscales, Social Functioning (SF) and Role emotional (RE) of the SF-36 and SFQ HL and NH groups.

	NH (n 109)	HL (n 94)	Statistics	p
HHIA (total score)				
Mean (SD)	3.8 (5.5)	31.6 (13.5)	W = 4702	< 0.005
HHIA (socio/situational)				
Mean (SD)	1.8 (2.8)	15.6 (7.0)	W = 4754	< 0.005
HHIA (emotional)				
Mean (SD)	1.8 (3.0)	22.4 (8.4)	W = 4700	< 0.005
Social functioning (SF-36)				
Mean (SD)	80.3 (3.8)	64.0 (7.0)	W = 3201	< 0.005
Role emotional (SF-36)				
Mean (SD)	77.4 (3.6)	67.4 (7.5)	W = 3548	< 0.005
SFQ (total score)				
Mean (SD)	4.6 (2.9)	5.9 (3.2)	W = 9692	< 0.005

Table III. SCL-90-R subscale scores and Global Severity Index in the normal hearing (NH) and hearing-impaired (HI) groups.

SCL-90	NH (n = 109)		HI (n = 94)		Test	p
	Mean	SD	Mean	SD		
Global Severity Index	0.42	(0.32)	0.50	(0.30)	W = 10134	0.021 *
Somatization	0.46	(0.29)	0.49	(0.30)	W = 10849	0.519
Obsessive-Compulsive	0.49	(0.30)	0.50	(0.29)	W = 9583	0.991
Interpersonal Sensitivity	0.48	(0.28)	0.60	(0.33)	W = 9702	0.001 **
Depression	0.50	(0.31)	0.68	(0.29)	W = 9187	< 0.000 **
Anxiety	0.48	(0.27)	0.56	(0.28)	W = 10161	0.022 *
Hostility	0.45	(0.30)	0.54	(0.29)	W = 10203	0.028 *
Phobic anxiety	0.27	(0.26)	0.38	(0.29)	W = 9943	0.005 **
Paranoid ideation	0.42	(0.28)	0.41	(0.27)	W = 9552	0.932
Psychoticism	0.24	(0.18)	0.23	(0.16)	W = 9571	0.911

Significance level: (*) $p < 0.05$, (**) $p < 0.005$

studied in elderly populations. The rare studies conducted with standardized rating scales also, or primarily, on employment-age adults have not followed a case-control design, making it difficult to take into account possible confounders such as age, sex, education, employment and marital status.

Taking into account that other possible confounders such as chronic tinnitus and vestibular disorders or aural rehabilitation were excluded by design, our findings clearly show that a population of working-age adults with acquired hearing impairment report, on self administered psychometric rating scales, higher levels of disability and of psychological distress and lower levels of social functioning than a well-matched normal control population.

The hearing-impaired individuals, in our study, have reduced ordinary social activities, experience increased relational problems with family and friends and greater emotional difficulties at work. This last observation partially confirms a recent trial on psychosocial work environment, hearing impairment and health which assessed that hearing-impaired workers report worse psychological well-being than normal hearing subjects, especially if they are employed in high-

stress-work type⁴⁰. In addition, hearing-impaired individuals reported much greater emotional and social problems than subjects with normal auditory function on a disease (hearing loss) specific scale (HHIA). The limitations to social functioning of the hearing-impaired in comparison to the non hearing-impaired are confirmed in our study also by the use of a robust and specific instrument such as the SFQ and confirm recent observations in Norway⁴¹.

The evaluation of psychological distress (SCL-90-R) shows a higher global level of distress in the hearing-impaired than in the control group. It is interesting to note, however, that this difference is not generalized across all subscales of the instrument used, the SCL-90-R, but is restricted to specific domains: anxiety, depression, phobic anxiety, interpersonal sensitivity and hostility. While elevation of the first two subscales does not suggest particular interpretative hypotheses, the last three subscales point more clearly to a relational dimension of the psychological distress experienced. Phobic anxiety, for example, is made by items describing fear of public spaces and crowds, where the hearing-impaired may find it more difficult to interpret language. Also hostility and interpersonal sensitivity are understandable psychological

reactions to frustrating interactions where a feeling of inferiority and anger may be elicited. Partially overlapping results have been found by Erikson-Mangold & Carlsson¹⁹ in a middle aged to elderly acquired hearing-impaired population with high levels of anxiety, depression and phobic anxiety, and, recently, by Fellingner et al.³⁰, in a population with profound hearing loss, where they found elevated levels of anxiety, depression and interpersonal sensitivity. The significant association of hearing handicap with presbycusis revealed from this study is apparently contradictory with a low rate of perceived disability/handicap of patients with noise-induced hearing loss³¹ but this may be due to the prevalent deterioration of high frequencies PTA in this latter series.

The cross-sectional design of our study does not allow us to better elucidate the possibly complex interplay between hearing loss (the audiological component), perceived disability (subjective experience of deficit), social functioning and psychopathological distress dimensions. It is, nevertheless, conceivable that the physiological deficit with its associated disability discourage hearing-impaired individuals to expose themselves to socially challenging situations, producing isolation that leads to depression, irritability, feelings of inferiority. The same psychological symptoms, on the other hand, can compound and worsen the picture by influencing social behaviour of the affected persons, e.g. by

fostering avoidance of social situations as a dysfunctional coping mechanism that leads to more disability and poor performance in a vicious cycle.

Further research studies, with a prospective design, may help to clarify these issues.

Conclusions

This study prompts two clinical recommendations. Staff in Audiological services, despite time and costs involved, can improve the efficiency of their assessment of hearing impairment by routinely exploring, with adequate psychometric questionnaires, a number of important and often neglected areas (i.e., emotional reaction to the disease and social functioning), that risk not being highlighted by a routine audiometric examination.

A second remark, relevant in the context of a large health-care public system, such as that in Italy, is that the appreciation of the increasing prevalence of hearing impairment with its negative effect, as documented here, on the individual's health-related QoL, disability and role functioning, largely justifies the allocation of financial resources in prevention, diagnosis and rehabilitation of hearing disorders also in the middle-aged population with mild to moderate presbycusis.

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