https://doi.org/ 10.33472/AFJBS.6.5.2024. 816-829

African Journal of Biological Sciences

AN INVESTIGATION OF THE ROLE OF HEARING IMPAIRMENT ON MENTAL HEALTH AMONG ELDERLY COUPLES

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Article History
Volume 6, Issue 5, Apr 2024
Received: 16 Apr 2024
Accepted: 24 Apr 2024
doi: ***10.33472/AFJBS.6.5.2024. 816-829***

ABSTRACT

Background: Hearing impairment is one of the most common chronic health conditions in the world. Hearing loss reduces the quality and quantity of a couple's communication. Considering the centrality of communication between spouses, a person's hearing loss may negatively affect the relationship. Communication problems manifest themselves through constant repetitions and misunderstandings.Aim: The aim of this study is to explore the role of hearing impairment on mental health in elderly couples.Methods: A total of 120 couples between the age ranges of 60 to 80 years came to Audiology clinic for routine check-up at SGT Hospital, Gurugram. The total population was divided into three different groups i.e., Group A (Experimental group I), Group-B (Experimental group II) and Group C (control group). Group A was further subdivided into A-I and A-II whereas Group B was subdivided into B-I and B-II. Univariate analysis, ANOVA followed by post-hoc Duncan's were used to estimate the effects of the hearing impairment of the self/partner on mental health of subjects and their partners with and without hearing aids. All the 3 groups, i.e.; groups with normal hearing, hearing impairment and hearing impairments with hearing aids were selected for the study. First of all, descriptive statistics was used followed by ANOVA and post-hoc analysis.Results: The result shows that the main effect of group, i.e., (individual with hearing impairment with hearing aids, hearing impairment, normal hearing, was found to be

significant ($p<0.001$) on mental health score. The results also showed that the mental health of individuals with hearing impairment was significantly poorer than normal hearing, hearing impairment with hearing aid was also significantly poorer than normal. Whereas, the mental health of hearing impairment was found to be worse than hearing impairment with hearing aids. Mental health of partners with hearing impairment was significantly poorer than normal hearing, hearing impairment with hearing aid was also significantly poorer than normal. Whereas, the mental health of hearing impairment was found to be worse than hearing impairment with hearing aids. Conclusion: The individuals with hearing aid had better mental health as compared toanindividual with hearing impairment. It shows that the prescription of hearing aids is helpful for patients with hearing impairment to improve their mental health. Similarly, subjects with hearing partners with Hearing aid have had better partners mental health as compared to individuals with hearing impairment. It depicts that the prescription of a hearing aid is not only helpful for patients with hearing impairment but also for those whose partners are impaired even if they are normal.

(Keywords: Hearing impairment, Hearing Aids, Mental health, Elderly Couples)

INTRODUCTION

According to Individuals with Disabilities Education Act, Sec. 300.8 (c) (5) hearing impairment means an impairment in hearing, whether permanent or fluctuating, that adversely affects a child's educational performance but that is not included under the definition of deafness in this section (1).APAdictionary defines mental health is a state of mind characterized by emotional well-being, good behavioural adjustment, relative freedom from anxiety and disabling symptoms, and a capacity to establish constructive relationships and cope with the ordinary demands and stresses of life (2).

Hearing impairment in elderly is considerablylinked with disability, increased risk of incident morbidity, poor self-perceived health (3). Also, evidence has be reported the association of hearing impairment with poor psychological well-being, low levels of self-efficacy and happiness (4). It has been also revealed that hearing impairment plays significant causal role in inducing anxiety, cognitive decline and lower health related quality of life (5).Abedi et al. and Abedi et al.concluded from their findings that deafness affects couples' relationship and can lead to decrement of emotional and physical intimacy, and hence hearing impairment can have negative effects on marital satisfaction (6, 7).

Hearing impairment is defined as a complete or partial loss of the ability to hear from one or both ears. Hearing loss affects access to spoken language, which can affect cognition and development and can negatively affect social well-being. As per the updated estimates from the Global Burden of Disease study on the prevalence of hearing loss in 2019, as well as the associated disability, an estimated 1·57 billion people globally had hearing loss accounting for one in five people (20·3%). Of these, 403·3 million people had hearing loss that was moderate or higher in severity after adjusting for hearing aid use, and 430·4 million without adjustment. The largest number of people with moderate to complete hearing loss resided in the Western Pacific region 127·1 million people. Of all people with a hearing impairment, 62·1% were older than 50 years (8).

Literature review was carried out keeping the title of the study in in mind.Studies related to hearing impairment in elderly couples, mental health in elderly couples, impact of hearing loss on mental healthin elderly couples, efficacy of intervention in mental health in elderly couples. Relevant research papers and study materials were also searched online from different websites, like Scopus, Google Scholar, Web of Science, PubMed, Springer Link, SCI-Hub, APA journals, etc. the findings from the few most appropriate research was included in the following sections of this paper.

Hintermair presented a report on the stressful experiences of parents with hearing-impaired children in Germany, wherein 317 parents completed a survey on how their families communicate and socialize, among other issues. The findings confirm the implication found in most reports describing empirical studies. Social support is to be regarded as a cornerstone of psychosocial intervention and has to play as great a role as possible in institutional programs (9).

Li et. al.in their research assessed depressionand hearing impairmentof elderly. They mentioned thatafter accounting for health conditions and other factors, including trouble seeing, self-reported hearing impairment and audiometrically determined hearing impairment were significantly associated with depression, particularly in women. The author highlighted that healthcare professionals should be aware of an increased risk for depression among adults with hearing loss (10).

Solheim etal**.** carried out a study with the aim to evaluate the effect of motivational counselling on hearing aid use.Elderly hearing aid recipients found to have low hearing aid use at a six-month follow-up appointment and to describe clients' subjective assessments of their perceived need for hearing aids three months after MI counselling (11).

Denneyand Boardman investigated associations between hearing impairment, household composition, marital status, and all-cause mortality for a representative sample of United States adults aged 40 and older. The risk of mortality over the follow-up period is estimated using Cox proportional hazard models. It was revealed that compared to those with good to excellent hearing, adults with moderate to severe hearing impairments and deaf adults had 11% and 21% higher risk of death from any cause over the follow-up period, respectively. Household composition and marital status, as indicators of household social support systems, associated independently with the risk of mortality but did not substantively change the association between hearing impairment and mortality. Hearing impairment represents an important contributor to the length of life for adults age 40 and older, independent of other important and established determinants of mortality (12).

West stated that disablement is a significant health problem and chronic stressor for older adults and is associated with negative mental health outcomes. Although some research has explored how disability extends beyond individuals to influence the mental health of their support networks, less population-based research has assessed the consequences of hearing impairment, a growing public health concern that affects 72.4% of people aged 65 and older. These findings suggest that hearing impairment can proliferate from one spouse to the other, but that this proliferation depends on gender. Healthcare providers need to be aware of the implications for husbands when treating women with hearing impairment (13).

Eichengreen, studied the importance of several aspects of EA and ER during adolescence, by showing their unique contributions to mental health development after controlling for each other's effects. Findings showed that decreases in certain emotional skills during adolescence might be warning signs for the subsequent development of mental health symptoms. It is suggested that interventions tailored at specific emotion skills would be beneficial the for prevention of distinguished mental health symptoms. Overall, findings pointed to the relatively positive situation of adolescents with and without hearing loss alike, in their EA and ER development (14).

Considering the findings of the above-mentioned studies the aim of the study was formulated as to study the difference between hearing impairment and control group on and mental health. Considering this, the aim and the objectivesof this research was formulated in the following manner.

Aim

This research aims to investigate the role of hearing impairment on marital health in elderly couples.

Objective:

To study the effect of Group (control group and impaired group), gender, hearing impairment of one partner, and hearing aids on mental health in elderly couples.

METHODOLOGY

Sample

In the present study, the sample size consisted of 120 couples (N=240). The age range of the sample was 60-80 years. The total population was divided into three different groups i.e., group A (Experimental Group I), Group B (Experimental Group, II) and Group C (control group).

Group A- I, included 30 impaired males with hearing aids and their 30 non-impaired female partners, whereas group A-II consisted of 30 non-impaired male and their 30 impaired female partners with hearing aids.

Participants in Group B-I included, 15 impaired males without hearing aid usage and their 15 non-impaired female partners. Likewise, group B-2 had 15 non-impairedmales with their 15 impaired female partners without usage of hearing aid.

In Group C, 30 male and their 30 respective female partners, both having normal hearing sensitivity participated in the study.

The couples constituted for the study coming for ENT for Audiological examination was contacted in OPD at SGT Hospital.

Tools used:

All the selected sample fulfilling the inclusion and exclusion criteria were assessed by using the following tools:

1. **Mental health check-list (MHCL)** The checklist consists of eleven items related to two type's symptoms i.e., mental and somatic with six and five items respectively. The responses of the individual in the checklist taped on four-point rating scale. The total score on the checklist ranges from 11 to 44 which reflects highest (good) to the lowest (poorest) mental health status of the individual (15).

2. **Pure Tone Audiometry(PTA):**PTA was used to identify hearing threshold level of the research participants. This device is also used to determine type,degree and configuration of a hearing loss. It indicates the softest sound audible to an individual at least 50% of the times. Hearing sensitivity is plotted on an Audiogram, which is a graphical representation of hearing threshold as a function of frequency. This is the non-invasive procedure to estimate the threshold of hearing. The human can perceive the frequency range from 20 Hz TO 20,000 Hz. The audible range of intensity for normal hearing human being are from -10 to 120 dBHL (16).

RESULTS AND DISCUSSION

Result of the study was calculated with the help of Statistical Package for Social Sciences (SPSS-IBM) version 16.0. 2X3 univariate analysis of variance statistical analysis was applied to see the mental health across three groups. Further, Duncan's post hoc analysis was used to see the differences between three groups on mental health.

As the study was conducted at SGT Medical College and Hospital, Budhera, Gurugram, Haryanawith the aim to study the role of hearing impairment on mental health in elderly couples. In the present study, the sample size consisted of 120 couples (n=240). The sample size was divided into three different groups i.e.; Group A (Experimental group-1), Group-B (Experimental group-2), and Group-C (Control group).Group-A was further subdivided into A-I and A-II, whereas Group-B was further subdivided into B-I and B-II. All the subject fulfilling the inclusion and exclusion criteria was assessed on and mental health domains

The obtained results are presented under the heading: Mental Health which is the dependent variableswhere **self**: when the subject himself is impaired and spouse is of normal hearing, and **partner**: when the subject himself is of normal hearing but his/her spouse is impaired.

The result of dependent variable i.e. mental health and one type of impaired subjects (Self or Spouse) is given. The summary table of ANOVA is presented. To further facilitate the interpretation, the post hoc Duncan's test table has been presented in each case, separately.

Mental Health: Self

In this section, the effect of hearing impairment in male and female subjects on mental health has been described.

Table 1.1:

Showing the descriptive statistics (Mean & SD) of Mental health scores across three groups (Individuals with hearing impairment with hearing aid, hearing impairment without hearing aid and normal hearing) of males and females

Hearing Status / **Gender**	**Normal hearing (Mean & SD) N=60**	**Hearing Impairment without Hearing aids (Mean & SD) N=30**	**Hearing impairment with Hearing Aid (Mean & SD) N=60**
Male(n=75)	a. 7.26 (2.94) (Good mental health) **n=30**	d. 20.33 (3.19) (Poor mental health). **n=15**	b. 10.80 (1.58) (Good mental health) **n=30**
Female(n=75)	f. 7.30 (2.91) (Good mental health) **n=30**	j. 20.26 (3.65) (Poor mental health). **n=15**	h. 10.56 (1.16) (Good mental health) **n=30**

***Lesser the score, better was the mental health.**

Table 1.1 is showing the descriptive statistics (Mean & SD) of mental health scores across three groups of males and females. It revealed that the mean scores of mental health of hearing-impaired males without hearing aid was 20.33 (3.19) (Poor mental health), whereas the mean scores of mental health of hearing-impaired females without hearing aid was 20.26 (3.65) (Poor mental health). Similarly, the mean score of hearing impairment with hearing aids males was 10.80 (1.58) (Good mental health) and for females 10.56 (1.16) (Good mental health).

On the other hand, the mean scores of mental health of individuals with normal hearing of males was 7.26 (2.94) (Good mental health) and for females was 7.30 (2.91), (Good mental health).

Table 1.2:

Summary table of ANOVA of Mental health scores across three groups (Individual with hearing impairment with hearing aid, hearing impairment without hearing aid and normal hearing) of males and females.

Dependent Variable: Mental health

Source	Type III Sum of Squares	Df	Mean Square	F	P<
Corrected Model	**3421.27**	**5**	**684.25**	**104.75**	**.001**
Intercept	21965.07	1	21965.07	3362.71	.001
Gender	.27	1	.27	.041	.840
Group (Hearing status of self)	**3420.41**	**2**	**1710.20**	**261.82**	**.001**
Gender*Group	.540	2	.270	.041	.960
Error	940.60	144	6.53		
Total	23335.00	150			
Corrected Total	4361.87	149			

a. R^2 = 0.784 (Adjusted R Squared = 0.777)

Summary table of ANOVA revealed that corrected model based on gender, hearing impairment group and their interaction was significant with F=104.75 at 5 and 144 degree of freedom. The probability was less than .001 for type-1 error.However, the intercept was also significant at 1 and 144 degrees of freedom being significant beyond .001 level of probability. It expressed that source other than in corrected model were also significant determinants for mental health in elderly. The R^2 for the corrected model was 0.78, i.e., the sources in the study explained 78.4 % of the total variance in mental health.

Table-1.2 isshowing the univariate analysis of mental health scores across three groups (Individual with hearing impairment with hearing aids, hearing impairment without hearing aid, and normal hearing. The result shows that the main effect of group, i.e., (individual with hearing impairment with hearing aids, hearing impairment without hearing aid, normal

hearing, was found to be significant ($p<0.001$) on mental health score . The F value for hearing status variable was 261.82 at 2 and 144 df. Mental health of normal hearing group was best ($\bar{X}=7.28$) whereas the mean mental health of hearing impaired without hearing aid was worst ($\bar{X}=20.30$). However, use of hearing aid was found to be helping the impaired having better mental health than without aid (10.68) Vs (20.30). To further verify whether the three means differed among themselves, Duncan's test was applied.

Table 1.3:

Post hoc (Duncan), mean comparisons among graphs of varied hearing status for mental health

Groups hearing status of self	**N=150**	**Subset**		
		1	**2**	**3**
1. Normal Hearing	60	7.28		
2. Hearing imp. with hearing aid	60		10.68	
1. Hearing Impairment without hearing aid	30			20.30
Sig.		**1.00**	**1.00**	**1.00**

After Duncan's post-hoc test, it was found that the mental health of individuals with hearing impairment was significantly poorer than normal hearing, hearing impairment with hearing aid was also significantly poorer than normal. Whereas, the mental health of hearing impairment without hearing aid was found to be worse than other two groups. The effect of gender on mental health in self-groups was found to be non-significant.

Mental Health: Partner

In this section the effect of hearing impairment of partners or spouses in male and female subjects on mental health has been described, the subjects themselves were not hearing impaired.

Table 2.1:

Showing the descriptive statistics (Mean ± SD) of Mental health scores across three groups (Partner of Individual with hearing impairment with hearing aid, hearing impairment without hearing aids and normal hearing) of males and females

Hearing Status / **Gender**	**Normal hearing (Mean & SD) N=60**	**Hearing Impairment (Mean & SD) N=30**	**Hearing impairment with Hearing Aid (Mean & SD) N=60**
Male(n=75)	**a**. 7.26 (2.94) (Good mental health) **n=30**	**e.** 20.26 (2.54) (Poor mental health). **n=15**	**c**. 12.13 (1.71) (Good mental health) **n=30**
Female(n=75)	**f.** 7.30 (2.91) (Good mental health) **n=30**	**i**. 18.33 (2.74) (Poor mental health). **n=15**	**g**. 11.83 (1.89) (Good mental health) **n=30**

Table 2.1 isshowing the descriptive statistics (Mean & SD) of mental health scores across three groups each of males and females. It revealed that the mean scores of mental health of males of hearing-impaired spouses was 20.26 (2.54) (Poor mental health), whereas the mean scores of mental health of females with hearing impaired partners was 18.33 (2.74) (Poor mental health). Similarly, the mean score of mental health of males with hearing impairment with hearing aids spouses was 12.13 (1.71) (Good mental health) and for females, it was 11.83 (1.89) (Good mental health).On the other hand, the mean scores of mental health of males with normal hearing partners was 7.26 (2.94) (Good mental health) and for females, it was 7.30 (2.91) (Good mental health).

Table 2.2:

Summary table of ANOVA of Mental health scores across three groups having partners with hearing impairment with hearing aid, hearing impairment without hearing aid and normal hearing) of males and females

Source	**Sum of Squares**	**Df**	**Mean Square**	**F**	**P<**
Corrected Model	**2934.77**	**5**	**586.95**	**95.605**	**.001**
Intercept	22310.81	1	22310.82	3634.07	.001

Gender	18.15	1	18.15	2.96	.088
Group (Hearing status)	**2905.37**	**2**	**1452.68**	**236.62**	**.001**
Gender X Group	20.27	2	10.14	1.65	.195
Error	884.07.	144	6.14		
Total	23887.00	150			
Corrected Total	3818.83	149			

a. R Squared = .768 (Adjusted R Squared = .760)

Summary table (Table-2.2) of ANOVA revealed that the corrected model based on gender, hearing impairment group and their interaction was significant with F=104.75 at 5 and 144 degree of freedom. The probability was less than .001 for type-1 error.

However, the intercept was also significant at 1 and 144 degrees of freedom being significant beyond .0001 level of probability. It expressed that source other than in the corrected model were also significant determinants for mental health in elderly having impaired partners. The R^2 for the corrected model was 0.78, i.e., the sources in the study explained 78.4 % of the total variance in mental health of subjects.

The univariate analysis of mental health scores across three groups (Partner with hearing impairment with hearing aids, hearing impairment, and normal hearing showed that the main effect of group, was found to be significant ($p<0.001$) on mental health score. The F value for hearing status variable was 236.62 at 2 and 144 df. Mental health of the group with normal hearing partners was best ($\bar{X}$=7.28) whereas the mean mental health of subject of hearing impaired without hearing aid partners was worst ($\bar{X}$=19.30). However, use of hearing aid by partners was found to be helping the subjects having better mental health than without hearing aid (11.98) Vs (19.30).

Table:2.3:

Post hoc (Duncan), mean comparison of three groups on mental health.

Group	**N=150**	**Subset**		
		1	**2**	**3**
1. Normal Hearing partner	60	7.28		
2. Hearing imp. with hearing aid partner	60		11.98	

3. Hearing Impairment partner without hearing aids	30			19.30
Sig.		**1.00**	**1.00**	**1.00**

After Duncan's post-hoc test, it was found that the mental health of subjects of partners with hearing impairment was significantly poorer than normal hearing and hearing impairment with hearing aid. Whereas, the mental health of subjects with partner having normal hearing was found to be better than having partner with hearing impairment with hearing aids. The effect of gender on mental health of subjects in self-groups was found to be non-significant, when their partners varying in hearing status.

CONCLUSION AND IMPLICATIONS

It is concluded thatthe main effect of the group, i.e., (individuals with hearing impairment with hearing aids, hearing impairment, normal hearing, was found to be significant ($p<0.001$) on mental health score.The results also showed that the mental health of individuals with hearing impairment was significantly poorer than normal hearing, hearing impairment with hearing aid was also significantly poorer than normal. Whereas, the mental health of hearing impairment was found to be worse than hearing impairment with hearing aids.The mental health of partners with hearing impairment was significantly poorer than normal hearing, hearing impairment with hearing aid was also significantly poorer than normal. Whereas, the mental health of hearing impairment was found to be worse than hearing impairment with hearing aids. The individuals with hearing aid were having better mental health as compared to individuals with hearing impairment. It shows that the prescription of hearing ais is helpful for patients with hearing impairment to improve their mental health. Similarly, partners of individuals with Hearing aids were having better mental health as compared to individuals with hearing impairment. It depicts that the prescription of hearing aids is not only helpful for patients with hearing impairment but also for their partners to improve their mental health.

ETHICAL CONSIDERATION

The ethical aspects for the research were cared properly, and followed diligently. All the participants were well informed prior to their recruitment for the research purpose that their participation is voluntary, and they can withdraw their participation at any time with or without any reason. They were also informed about the purpose of the study, their role, and

about the publication formalities. Consent and confidentiality related aspects were taken care seriously.

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