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RESEARCH ARTICLE

Do blind people have better hearing levels than normal population?

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Key words:-
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Abstract

Objective: To find out if there is a difference in hearing levels between normal and blind people. To answer the following questions, "Is the concept of losing one sense will improve the other senses right or wrong? If someone born blind, will he have better hearing abilities than those with a good vision?"

Study design: A cross sectional study

Methods: Forty male students aged between 13-22 years old from two special education schools were randomly selected to evaluate their hearing levels from Eastern district, Saudi Arabia at the period from February 2016 to April 2016. They were divided into two groups. The first group included the student with visual impairment (13 students) and total blindness (7 students) for more than 5 years. The second control group is of 20 students with normal vision. A questionnaire was answered by each one. Anyone with history of ear disease was excluded from the study. A pure tone average thresholds (PTAs) were obtained for left and right ears for the frequencies 0.125, 0.25, 0.5, 1, 2, 4, and 8 kHz. Data were statistically evaluated using SPSS version 20.

Results: Hearing levels were normal in most of the participants with mild hearing loss in 4 ears of 3 participants (5%). The difference at the hearing levels between pure tone average for both ears in the visually impaired plus totally blind subjects compared to the control group was non-significant, P value = 0.829 (> 0.05). While, there was significant difference at the hearing levels between pure tone average for both ears in the three groups (visually impaired, totally blind and normally sighted group) using ANOVA test, P value = 0.04 (< 0.05) with the lowest hearing level at the totally blind group.

Conclusion: Loss of one sense does not potentiate other senses as some people believe. Blind people have the same level of hearing as normal population.

Introduction:-

Communication and people interactions in our daily life activities depend on hearing and vision [1]. Most blind people were not born blind, they become blind. This means that, having learned to rely on their sight in order to recognize and relate to the world, they must now radically revise their basic assumptions about that world [2-3].

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It is reported that 285 million people are estimated to be visually impaired worldwide. Thirty nine million are blind and 246 million have low vision [4]. In Kingdom of Saudi Arabia (KSA) there was study conducted on 14,577 people representing the settled population of KSA. The survey revealed that 1.5% of the population are blind and another 7.8% are visually impaired according to the World Health Organization definition [5].

Hearing is one of the important senses by which we can understand & communicate with surroundings. Hearing thresholds of 25 dB or bigger in any ear is said to have hearing loss (HL). HL may be mild, moderate, severe or profound. It is reported as well that about 360 million people worldwide have disabling hearing loss [6].

Loss of one sense will affect other senses. Music experts often cite blind musicians Stevie Wonder and Ray Charles as examples of how a lack of sight can heighten or enhance hearing. Therefore loss of vision can result in changes in auditory perceptual abilities and in the way sounds are processed within the brain [7]. A number of studies have reported that people who become blind at an early age can hear notes and localize sounds more precisely than those with sight or people who go blind later in life [7]. In a same conception, a recent review on visual abilities in the profoundly deaf suggests that enhanced visual performance in those group [8&9]. King in 2015 reported that blind persons are dependent on their hearing as they develop superior auditory skills, either as a result of plasticity within the auditory system or through the recruitment of functionally relevant occipital cortical areas that lack their normal visual inputs [7]. Improvements in hearing abilities following blindness may result from an increase in cortical territory devoted to auditory processing (10).

To find out if there is a difference in hearing levels between normal and blind people. To answer the following questions, "Is the concept of losing one sense will improve the other senses right or wrong? If someone born blind, will he have better hearing abilities than those with a good vision?"

Material and Methods:-

The study was conducted with the help of the hearing and speech department in the special education center, Khalid bin Al-Walid middle school, and Al-Mubarraz high school, Eastern district, Saudi Arabia from February 2016 to April 2016. Forty male students aged between 13-22 years old from both schools were randomly selected to participate. The participants were divided into two groups, each group consisted of 20 students based on the visual acuity. The first group included the student with visual impairment (13 students) and total blindness (7 students) for more than 5 years. The second group had 20 students with normal vision, constituting the control group. An informed verbal consent for their participation in the study was obtained at the beginning with explanation of what the research is about to all the participants. A questionnaire was answered by each one of them about their history [Fig1]. It includes the history of chronic diseases, ear problems, the use of hearing aids, family history of ear problems, the use ototoxic drugs and past history of ear surgery. Anyone with history of ear disease was excluded from the study. A pure tone average thresholds (PTAs) were obtained for left and right ears for the frequencies 0.125, 0.25, 0.5, 1, 2, 4, and 8 kHz. Data were statistically evaluated using SPSS version 20.

Name

Age Gender Nationality

1) Are you suffering from any chronic disease/ diseases?
   Yes No if no go to Q3
2) What is the disease/ diseases?
   Diabetes Mellitus Hypertension Others
3) Do you have any ear problems?
   Yes No if no go to Q6
4) What is the problems? (You can choose more than one answer)
   Congenital anomaly Decreased hearing ability Pain
   Buzz Excess ear wax Dizziness
5) Do you use any hearing aids?
   Yes No
6) Does any of your family members suffer from ear problems?
   Yes, Relation (.....) No
7) Do you use any drug regularly?
   Yes No if no go to Q9
8) If you answered yes to the seventh question, what is the name of this drug / these drugs?
   (.....)
9) Did you perform any surgery in your ear in the past?
   Yes, what was it? (.....)
   No

Figure 1: Questionnaire

Results:-

Our study included 40 participants. They all replied the questionnaire and the findings are shown in figure 2.

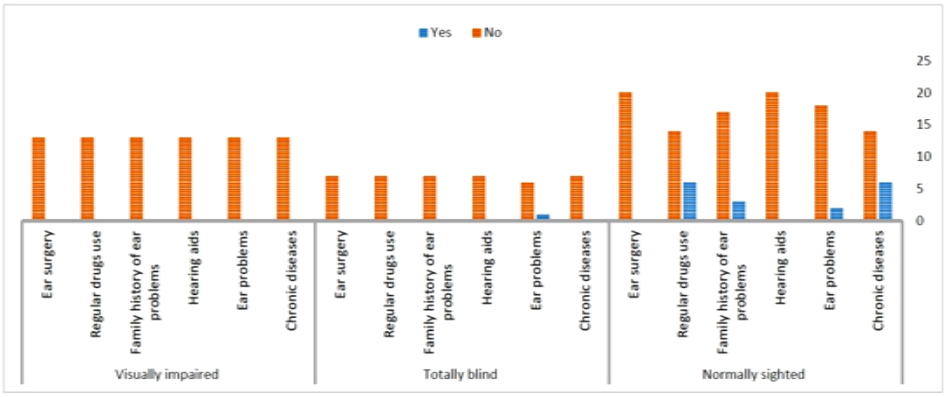

Figure 2: questionnaire findings

They were visually impaired subjects (13=32.5%), totally blind persons (7=17.5%) and normally sighted controls (20=50%). The average age of the visually impaired group was 16 ± 2.1 years, the totally blind group was 16.6 ± 2.8 years, and the normally sighted group was 15.2 ± 1.5 years [table 1]. All the 40 participants were Saudi males.

Table 1. Descriptive statistics regarding age of the study group

	N	Mean	Minimum	Maximum	SD
Visually impaired	13	16	13	20	2.1
Totally blind	7	16.6	14	22	2.8
Normally sighted	20	15.2	13	17	1.5

Hearing levels were normal in most of the participants with mild hearing loss in 4 ears of 3 participants (5%) [table 2].

Table 2. Pure tone averages in R and L ears

Visually impaired		**Totally blind**		**Normally sighted**	
PTAs R ear (db)	PTAs L ear (db)	PTAs R ear (db)	PTAs L ear (db)	PTAs R ear (db)	PTAs L ear (db)
5	5	18	21	20	20
13	10	10	15	20	20
18	12	12	16	15	20
10	15	20	20	11	11
13	7	35	36	16	16
16	17	16	20	15	15
15	15	32	20	17	17
18	18			15	15
20	20			16	16
15	15			15	15
23	20			15	15
15	15			15	15
21	17			15	15
				25	25
				15	15
				15	15
				15	15
				15	15
				15	15
				33	17

Pure tone average ranges from 5 to 23 dB for the visual impairment group (mean 14.9 dB), 10 to 36 dB for the total blindness group (mean = 20.8 dB), and 11to 33 dB for the normal sighted group (mean = 16.6 dB).
Using independent sample T-test SPSS version 20, there was non-significant difference at the hearing levels between pure tone average for both ears in the visually impaired plus totally blind subjects with the control group, P value = 0.829 (> 0.05) [table 3].

Table 3. Independent sample T-test results

	N	mean	SD	t	df	P value
Visually impaired + Totally blind	20	16.97	6.33	0.217	38	0.829 (> 0.05)
Normally sighted	20	16.63	3.44			

While, there was significant difference at the hearing levels between pure tone average for both ears in the three groups (visually impaired, totally blind and normally sighted group) using ANOVA test, P value = 0.04 (< 0.05) with the lowest hearing level at the totally blind group [table 4].

Table 4. ANOVA test results

	N	mean	SD	S error	F	P value
Visually impaired	13	14.9	4.4	1.2	3.505	0.04 (< 0.05)
Totally blind	7	20.8	7.8	2.9		
Normally sighted	20	16.6	3.4	0.7		

Discussion:-

This study was planned based upon the hypothesis that sensory deprivation (e.g. blindness) may has some effect on the intact senses. Blind people depend more on their intact sensory modalities (e.g. hearing), making them sharper and perform better compared to normal performance in order to compensate the lack of visual inputs [6].
Our study showed that the mean pure tone average for both visually impaired and totally blind to be 14.9 dB and 20.8 dB respectively compared to 16.6 dB in normally sighted people. Which means that totally blind participants have significantly worse hearing abilities than sighted age matched controls, and that against our conception [11]. Participants with visual impairment didn't show significant difference from the sighted age matched controls, and that could be due to having some residual visual abilities.

Most of the previous studies which were similar to our study focused on the ability of a blind person to localize sounds in comparison with normally sighted person. Nilsson & Schenkman reported that due to sound being the only source of information used for sound localization for a long term, the blind has greaterinter-aural time differences sensitivity and inter-aural level differences sensitivity compared to sight age-matched [12]. Another study by Kolarik et al. focused on the distance discrimination, suggesting that totally blind people have better sound distance discrimination than sight age-matched and no difference when comparing people with partial visual loss to sight age-matched [11].

Limitations:-

Our study cannot be generalized to all the blind, since it was done only for a small number of blind people in a very limited area.

Conclusion:-

Loss of one sense does not potentiate other senses as some people believe. Blind people have the same level of hearing as normal population.

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