



Effectiveness of the interventional program for empowering mothers with hearing-impaired children for the improvement of expressive language skills

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Abstract

Background & Aims: Family-centered care demands family to be accepted as the primary core of all cares neglected in practice. The purpose of the study was to plan and put into effect a family-centered interventional training program for the empowerment of mothers while examining its effectiveness on the expressive language skill of children with hearing impairment.

Materials & Methods: The sampling method in this process was a randomized controlled trial of the available type. The samples were selected from the people who referred to the centers providing speech therapy services to hearing impaired children in Shiraz (Iran). By selecting random blocks, 35 people were placed in each intervention and control groups. Family-centered intervention was scheduled into 6 sessions, each session lasting 80 minutes. Meantime, we used a researcher-made questionnaire and Newsha developmental scale to assess mothers' empowerment and children's speech development, respectively.

Results: Data gathered from 35 intervention and 33 control group members were carefully examined. Repeated measurement test used for the assessment of primary and interactional effects of "time" and "group" showed the effect of time (i.e. pretest, posttest, and follow-up) on the variables of "awareness", which was significantly large. As for the "self-efficacy" variable, the triple time stages have also proved effective. Time and interaction both manifested a meaningful effect on "child's expressive language skills" ($P < 0.001$). However, "self-esteem" skills and "perceived support" did not show significant differences between time and group effects ($P > 0.001$).

Conclusion: The study wraps up by affirming the role of family-centered intervention programs in expanding the ability of mothers with hearing-impaired children and, consequently, upgrading the expressive language skill of the child.

Keywords: Children, Expressive language, Hearing loss, Mothers

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Introduction

In recent years, by virtue of hearing screening programs, adaptation of family and coping of parents with hearing-impaired children have changed remarkably. Today, parents are informed about the hearing impairment of their child upon his/her birth and, henceforth, they are subjected to suffering from an early lack of privilege to live alongside a normal child (1, 2). The success of a hearing-impaired child equally relies on how warmly he/she is received by parents and how well he/she can communicate with the family (3). After facing the fact about the impaired child, parents gradually develop the feeling of respect. Also, they feel duty bound to express their deep affection regardless of the child's disadvantage and modify their lifestyle in a manner so as to best adapt to the child's exceptional needs (4, 5).

In the past two decades, the world has witnessed the emergence of community-based rehabilitation (CBR) as a strategy to help people with disabilities. CBR is a plan of action within community development for the rehabilitation, equalization of opportunities, and social integration of all people with disabilities (6-8). Over 90 countries are actively pursuing schemes involving the implementation of CBR (9). Nevertheless, training of family is the bedrock of any CBR program (10). In the meantime, training is considered a principal strategy for the promotion of individual, group, and social empowerment (11, 12).

Diagnosis of chronic hearing impairment in children has varying degrees of reverberations for the family, with footprints that land on each and every member. What fundamentally matters at this stage for the family is to preserve its norms and appropriate interactions, a task demanding equal responsibility on behalf of all members. Outside care provided for underdeveloped children, including those with hearing impairments, is frequently degraded in quality and, in many instances, proves more problematic than beneficial for families (13-15). However, the promising thing is that early intervention helps reduce the scope of these children's problems and also assist the mother in better adaptation of problems (1, 16, 17). The results

of a former study have indicated the effectiveness of education in the family in the community-based rehabilitation program in order to improve the performance of the disabled in some selected groups (18). According to the above-mentioned statements, having a disabled child not only affects the individual but also challenges the family and influences the health level of the family members. In this regard, studies have indicated the low level of general and mental health and the existence of communication challenges and unhealthy interactions among the parents of these children. Likewise, hearing problems are major disorders, and speech and communication disorders are one of the most important developmental disabilities of these people. On the other hand, cochlear implantation does not completely eliminate children's hearing disabilities, or in other words, it cannot completely restore hearing function. Considering the significant function of the family in education and rehabilitation, paying attention to child's needs and problems is very important and can play a decisive role in the success of CBR programs and family-oriented interventions (19, 20). Therefore, it is required to first understand the need of these families (especially mothers) in taking care of their children and then identify obstacles in this regard, ultimately facilitating factors of mothers' ability to develop children's speech.

In Iran, no study has been conducted on the experiences and needs of parents of having a disabled child, as well as effective factors in their participation in the treatment process of their children. Moreover, scant investigations have also been performed in this regard at the international level, and our information and knowledge in this matter are limited. Therefore, the necessity of a qualitative research in this field is highly felt. Given this in mind, we first used qualitative research to identify the needs of parents with hearing-impaired children and facilitate factors and barriers to mothers' ability in their child's speech development. According to the above-mentioned information that having a disabled child not only influences the individual but also challenges the family and affects the health level of the family members, there is a need

for intervention programs for parents to increase their awareness, participation, and ability, subsequently contributing to the effectiveness of treatment and reduction of mental disorders and stress.

Materials & Methods

a- Participants

This parallel randomized controlled trial was performed in the speech therapy centers, where the children with the impaired hearing are served, in Shiraz city of Iran in 2016. The study protocol was approved by the Ethics Committee of Isfahan University of Medical Sciences Isfahan, Iran (ethical code: 393789.1393IR. Imus.Rec.) and registered in the Iranian Registry of Clinical Trials based on the license (no: IRCT2016111230857N1). The targeted samples included mothers with the hearing-impaired children who were referred to the aforementioned centers for the speech therapy of their children. Participants were chosen from people who attended two rehabilitation centers providing speech therapy services to hearing-impaired children in Shiraz, named Soroush and Gasedak. The inclusion criteria included: (1) "hearing parents", parents with a hearing-impaired child in the age range between one and seven years with the speech problems, the lack of impaired hearing in their other children, the lack of a disability other than speech and hearing impairments, and parents volunteer to participate in the research. People who suffered from more than two cases of the absence from the intervention programs or had the intent for complete withdrawal from the trial were excluded. Thus, the randomized block selection method was used to establish the control group and intervention group with the allocation concealment principle. It was notable that the individual who was responsible for dividing the participants was unaware of the division of groups. In addition, based on the study of Samadi et al. (21) and the sampling formula for quantitative studies, the sample size was determined. Overall, 70 cases were selected; 35 cases were assigned to the control group and 35 cases to the intervention group.

$$N = \frac{2\sigma^2(z_\beta + z_{\frac{1-\alpha}{2}})^2}{\tau_M^2}$$

b- Intervention

In order to initiate the trial, our research team preliminarily investigated the parameters influencing the parents' empowerment in order to contemplate and design a training package. Then we comprehensively devised this package in mind based on the training protocol involving the scrutinized parameters and defined its schedule for implemented in six sessions so that each session prolonged 80 min. It should be noted that we focused on important cases such as the initial evaluation, coping, mothers' information of the impaired hearing and hearing loss, their perception and commands of intervention basics for their children with the impaired hearing, child-raising, parents' empowerment, and self-confidence increase. The sessions were structured in the presence of the research team, a psychologist, and a speech therapist. Afterwards, the mothers were given a booklet containing the guidelines via home assignments and post session exercises. Furthermore, we distributed a supplemental brochure under "How Can I be Useful" among all of the participants. Notably, the sessions were uniform with regard to the participated individuals and the nature of the organizing center at the mentioned two centers in regular durations. Finally, all sessions included a distinct range of applied and theoretical guidelines as follows:

A: To meet the informational and educational needs, we prepared the following educational contents: increasing the awareness and knowledge of mothers regarding various aspects of deafness and hearing loss of children.

B: To address the need for support from those around and to build mental and psychological capacity, we prepared the educational content, including methods for the improvement of self-confidence and resilience of parents, especially mothers in problems.

C: To achieve the facilitating factor of normalizing the conditions, we prepared the educational content such as improving the awareness of mothers about deafness and hearing loss, as well as the skills of working with children to improve the conditions.

D: To achieve the facilitating factors of increasing the ability of mothers and using environmental resources, the following educational content was prepared: increasing the ability of mothers in teaching a hearing-impaired child and improving their self-confidence.

E: To reduce the obstacles of working with a hearing-impaired child, educational content, including

the skills of working with a child and methods of raising children with disabilities, was prepared. At the same time, conditions were planned to discuss the problems of parents.

F: To decrease the obstacle of parents' false beliefs, conditions were planned to discuss parents' beliefs and correct them.

G: To lessen the obstacle of parents' incompatibility, in addition to preparation of content regarding communication and interaction with the child, we planned parents with each other and with therapists, conditions for practical training to face these conditions.

Table 1. Curriculum of intervention

Meetings	Behavioral goals
First session	Increasing mothers' awareness and knowledge about different aspects of the disorder and reducing their false beliefs
Second session	Reducing the obstacles of working with a hearing-impaired child and parental incompatibilities
Third session	Improving the awareness of mothers in relation to children's behavioral issues, skills of working with children and achieving the facilitating factor of normalizing the situation
Fourth session	Gathering information to use strategies to increase the individual capabilities of mothers
Fifth session	Meeting support needs and building mental and psychological capacity
Sixth session	Improving the awareness of mothers and reducing the obstacles of working with a hearing-impaired child and parental incompatibilities

Educational area: Psychomotor, cognitive, emotional; teaching method: lecture-question and answer; educational tools: whiteboard, educational slides, video projector; time: 80 minutes

c. Instruments for data collection

According to the research design, two distinctive instruments, including a researcher-made scale and Newsha scale, were used to collect the data. The researcher-made questionnaire included the family (mothers) empowerment such as awareness, self-esteem, self-efficacy, and the perceived support, which were utilized to evaluate the effects of the training plan on participants. Moreover, demographic data involved the mothers' age, children's number their parents' educational level and employment, children's age at the time of the impairment emergence, their age at the time of the application of the cochlear implant, and their gender, as well as life conditions. In addition, data on the mothers' empowerment to survey their scale of

empowerment included four parts of awareness, self-esteem, self-efficacy, and the perceived support. The section for measuring the ability of mothers includes the sub-areas of awareness with 16 questions (seven questions in the form of four options and nine questions in the form of true and false) where a correct answer is given a score of one, and an incorrect answer is given a score of zero. Self-esteem section with nine questions and range of scores between 9 and 45, self-efficacy with 11 questions and range of scores between 11 and 55, and perceived support with 5 questions and range of scores between 25 and 5. Furthermore, the items were devised according to the Likert five-balanced response scale (i.e. "I Perfectly agree", "I Agree", "No Comment", "I disagree", and "I Totally

Disagree") scoring between 1 and 5. The face and content validity of the studied tool were carried out qualitatively using a panel of experts. Afterwards, the questionnaires were distributed among the seven respective experts so that their comments on the relevance and language intelligibility, easiness in responding, and the matched concepts were included. In addition, a further face validity was examined by a group of six non-participant mothers for reporting other instances of vagueness for final revisions. The reliability of the tool was also examined through internal consistency and using Cronbach's alpha, whose alpha coefficient was reported as 83% awareness, 80% self-esteem, 85% perceived support, and 80% self-efficacy. A researcher-made questionnaire of awareness, self-esteem, perceived support, and self-efficacy was completed by the participants before the intervention, one month and three months after the intervention. Subsequently, to measure the severity of speech disorders, we used Newsha developmental scale, the only valid test to measure the growth of Persian-speaking children. This instrument deals with the evaluation of seven developmental spheres of children, that is, the received language, hearing, spoken language, sociability, speech, motor skill, and cognition since the birth to the age of six. We assessed the speech domain in 13 age groups. In fact, each item of the scale was allocated to a score of one, and the development levels were the domain criterion-based so that a minimum score and greater signified a development compatible with the landmark at the

supposed age. Moreover, those scores below the minimum in two independent runs in a time lower than one week implies the fact that the child has not approximated his/her developmental landmark and thus should be assessed in the lower age group. Therefore, it was possible to determine the developmental delay of a child corresponding to the normal children of their age group. Notably, the Newsha developmental scale was considered to be an integrated scale designed in Iran to evaluate the developmental skills of the native Iranian people so that its reliability and validity were analyzed and confirmed by the experts in the field. Thus, this tool was completed by a speech therapist and the relevant therapist before the intervention, three and six months after the intervention. Finally, SPSS16, the repeated measure ANOVA, statistical descriptive method, and Bonferroni post-hoc test were employed to analyze the data. The Kolmogorov-Smirnov test was also used for the normality of the data. The statistical significance level was considered as <0.05 .

Results

The mean ages of mothers participating in the intervention and control groups were 29.47 (4.12) and 29.72 (4.47) years old and those of fathers were 33.66 (4.53) and 34.39 (5.31), with $P=0.80$ and $P=0.54$, respectively. Also, the mean ages of children in the two mentioned groups were 3.83 (1.29) and 4.30 (1.46), respectively, with the P value of 0.16. Distribution of demographic variables did not show any significant intra-group difference ($P<0.05$).

Table 2. Demographic characteristics of the studied people based on group membership

Variable	Group	Intervention Group		Control Group		Sig.
		Number	Percent	Number	Percent	
Gender of the child	Girl	16	44.4	18	54.5	0.47
	Boy	20	55.6	15	45.5	
Mother's education	Illiterate	1	2.8	0	0	0.12
	Elementary	2	5.6	8	24.2	
	Guidance	9	25	8	24.2	

Variable	Group	Intervention Group		Control Group		Sig.
		Number	Percent	Number	Percent	
Father's education	High school	16	44.4	8	24.2	0.41
	Academic	8	22.2	9	27.3	
	illiterate	0	0	2	6.1	
	elementary	3	8.3	3	9.1	
	guidance	13	36.1	12	36.4	
	High school	13	36.1	7	21.2	
	Academic	7	19.4	9	27.3	
Family relationship with spouse	Yes	30	83.3	25	75.8	0.55
	No	6	16.7	8	24.2	
Presence of a specific disease in the mother	Yes	-	-	-	-	-
	No	36	100	33	100	
Presence of a specific disease in the father	Yes	-	-	-	-	-
	No	36	100	33	100	
Living condition	Divorced	3	8.3	0	0	0.24
	The widow	-	-	-	-	
	Common life	33	91.7	33	100	
Independent life	Yes	29	80.6	26	78.8	0.99
	No	7	19.4	7	21.2	

The mean and deviation of "Mother's empowerment" criterion for the scopes of "awareness", "self-esteem", "perceived support", "self-efficacy", and also "child's expressive language skill" are presented in Table 3. Using repeated measurement test to determine the differences in descriptive indexes in order to evaluate the primary and interactional effects of "time" and "group" shows that time (i.e. the triple "pretest", "posttest", and "follow-up" stages) has a significant effect on "awareness" variable. As for "self-efficacy" variable, all three-time stages demonstrated a

significant effect, while for the "child's expressive language skill" variable, effects of time and interaction were both significant ($P < 0.001$; Table 4). Moreover, Bonferroni test results indicated a significant difference between pretest vs. posttest and pretest vs. follow-up stages for the variable "awareness". The same significant difference was recorded for "self-efficacy" variable in the pretest vs. posttest time stage. Regarding "child's expressive language skill", a significant difference was observed for all three stages (Table 5).

Table 3. Mean and standard deviation of awareness and mental-psychological capacity building and its domains based on group membership

Variable	Group	Pre-test	Post-test	Follow-up
		Mean (SD)	Mean (SD)	Mean (SD)
Awareness	Intervention	12.41(2.54)	13.69(1.14)	13.50(1.38)
	Control	12.18(1.89)	12.8(1.69)	13.00(1.80)
Self-esteem	Intervention	14.63(2.30)	15.19(2.70)	15.27(2.38)
	Control	15.09(3.11)	15.30(2.30)	15.69(2.75)
Perceived support	Intervention	28.55(4.74)	28.27(5.19)	28.78(5.14)
	Control	28.66(4.90)	28.80(4.52)	29.69(6.67)
Self-efficacy	Intervention	55.27(9.37)	59.38(9.51)	63.94(13.78)
	Control	55.84(9.31)	56.48(12.83)	56.48(12.83)
Expressive language skill	Intervention	0.53(0.18)	0.72(0.18)	0.86(0.17)
	Control	0.65(0.20)	0.68(0.19)	0.78(0.18)

Table 4. Repeated measures test to evaluate the main and interactive effects of time and study groups

Variable	Source of variation	Df	F	Sig.	Partial Eta Squared
Awareness	Between-group	1	2.50	0.11	0.03
	Time effect	2	1.29	<0.001	0.14
	Time & group effect	2	0.69	0.50	0.01
Self-esteem	Between-group	1	0.36	0.54	0.005
	Time effect	2	2.00	0.13	0.03
	Time & group effect	2	0.19	0.82	0.003
perceived support	Between-group	1	0.26	0.61	0.004
	Time effect	2	0.67	0.50	0.01
	Time & group effect	2	0.16	0.84	0.002
Self-efficacy	Between-group	1	2.63	0.03	0.04
	Time effect	2	4.82	0.01	0.06
	Time & group effect	2	3.35	0.03	0.05
Expressive language skill	Between-group	1	0.01	0.98	0.01
	Time effect	2	43.38	<0.001	0.34
	Time & group effect	2	8.67	<0.001	0.12

Table 5. Within-group pairwise comparisons using Bonferroni test

Variables	Pairwise comparison	Mean difference	Standard error	Sig.
Awareness	Pre-test-post-test	-0.98	0.26	0.001
	Pre-test-follow-up	-0.95	0.27	0.002
	Post-test-follow-up	0.03	0.20	0.99
Self-efficacy	Pre-test-post-test	-2.34	1.45	0.33
	Pre-test-follow-up	-4.65	1.91	0.04
	Post-test-follow-up	-2.30	1.21	0.18
Expressive language skill	Pre-test-post-test	-0.11	0.03	<0.001
	Pre-test-follow-up	-0.23	0.02	<0.001
	Post-test-follow-up	-0.12	0.02	<0.001

Discussion

According to repeated measurement test used for examining differences in descriptive indexes, the effect of time (i.e. the triple "pretest", "posttest", and "follow-up" stages) was only meaningful for "awareness" variable. Hence, it can be deduced that both experimental groups (i.e. intervention and control) had an increasing awareness score, meaning that the intervention and training program plus the routine services offered by the centers can raise the awareness of mothers and respond to their overall needs. No intragroup difference was observed in this particular case, and only the time of participation in programs appears determining. However, intervention offered by this study and those routinely provided by the center showed no meaningful effect on self-esteem and perceived support.

Various research, including that of Dias and et al. (2013), has emphasized the importance of training interventions being provided by speech therapists to raise awareness and improve the understanding of socioemotional tongue-tie as an instance of speech impairment. The study underlines the possibility to use health training programs to create a useful training source for the early detection of impairment and follow-up intervention. A useful intervention targeting tongue-tie impairment is one that involves processes to raise the awareness and knowledge about the

impairment, while informing the target population about the availability of helpful speech therapy interventions for the impaired child (22). Knowledge enhancement, as an effective ingredient of intervention targeting hearing-impaired children, has been addressed by several other investigations (23). Deepak et al. (2013) have recommended the implementation of CBR program and highlighted the benefits it offers to the population with disabilities (24). In the study of Prizant et al. (1993), language and speech pathologists were urged to upgrade their knowledge of possible parental-responses (e.g. guilty conscience, frustration, denial, etc.) to child's impairment and draw up appropriate measures to meet their needs, expectations, and concerns (25).

As for the self-efficacy of mothers, the results imply a significant difference between the two groups in the course of time. Self-efficacy of mothers is defined in terms of their potential and confidence in accepting and fulfilling their duty as a mother. By addressing these aspects, training proves a useful tool for empowering mothers. These uplifting factors help encourage mothers to better cope with the child and improve their functions. Research unanimously underscores how mother's empowerment in dealing with child increases mother's level of self-confidence and strengthens her will to learn from her encounters and interactions with the environment. In the

meantime, the researchers have recommended the incorporation of procedures based on project-based learning, mini-group discussion, individual learning, and so forth in programs aimed at raising the level of self-confidence and skill in mothers (26, 27).

Findings of repeated measurement test, which was used to determine differences in descriptive indexes associated with primary and interactional effects of "time" and "group" on "child's expressive language skill" variable, reflected a meaningful value, which, in turn, is an indication of an overall difference in the mean value of variables for both groups in the course of time. The results concurrently suggested the effect of time-group interaction on "received language skill" and "speech language skill" to be equally significant, implying a meaningful difference in the mean values of the two groups at various studied stages of time. It can, therefore, be surmised that training intervention significantly increases the level of speech language skill. Moreover, the quantitative assessments in the present study found that the implementation of environment and family-centered intervention to have a critical function in upgrading the studied variables on equal grounds to that suggested by Prizant et al. (1993) with respect to the role of family and associates in improving the treatment process. While emphasizing on the dire need to deliver environment and family-centered intervention, these authors deliberated on how a coherent intervention embracing the various community factors can prove effective in improving the condition of hearing-impaired children (25).

Resolving barriers and encouraging parents, especially mothers, to take advantage of facilitating factors was also recommended by the obtained results to serve as a measure for enhancing mother's ability and easing the burden of working with the child, implementing and following up appropriate training at home, and, consequently, enhancing the speaking ability of hearing-impaired child. In line with the present research, Buschmann et al. (2008) examined the effects of a two-year family-centered lingual intervention on children with speech delay. The clinical trial involved the participation of mothers in

Heidelberg Parent-Based Language Intervention program. Children were assessed 6 and 12 months after intervention. The researchers found the family-centered intervention to speed up the speech progress at a significant level (23). Alternately, Samadi et al. organized a six-month coherent parent-child hearing development intervention program for 15 children under the age of 3 with hearing aid and severe sensorineural hearing loss. Children's hearing level was assessed before and after (six months) intervention. The mean pre-intervention speech skill development rate and the efficiency index of intervention were measured at 0.31 and 0.87, respectively, which are statistically significant. Simultaneously, the mean relative change index determined the preintervention speech skill development rate to have grown by 2.38 folds over the course of intervention. The study was wrapped up with the effectiveness of coherent parent-child hearing development intervention program on the development of speech skills in children with hearing impairment (21). The effectiveness of family-centered interventions has been the topic of numerous other studies (28). These studies unanimously highlighted the cost-effective nature and outcome of interventions in different countries, calling for their wide-scale probing and implementation on a parent-empowering basis (27).

In an alternate attempt, Salamati et al. investigated the effectiveness of family training program (as a subsidiary of the state-wide CBR Plan) on the disabled population covered by care and hygiene networks in 21 pilot provinces. Subjects were assessed after intervention, and findings suggested that the program was effective in terms of boosting the functioning and performance of the disabled in a given number of categories studied (18).

There are several limitations to present research, including the failure to cover the social and cultural conditions involved. Meantime, the experiments were solely carried out in relevant centers in Shiraz and, thus, the results cannot be generalized. The limited follow-up period can also influence the long-term effectiveness of the findings. The present study was

planned in line with the knowledge and experiences of individuals involved in the subject matter and with due consideration of the indigenous cultural, social, and economical patterns and demands in Iran. The results concertedly support the effectiveness of the topic of research on the empowerment of mothers and the improvement of expressive language skills of the hearing-impaired child. While laying stress on the crucial necessity for state and private rehabilitation centers to adopt and deliver the proposed program, the study recommends similar attempts to be made with extended follow-up durations.

Conclusion

The design and implementation of family-based interventions are effective measures enabling mothers to contribute more productively to the enhancement of speech skills in children with hearing impairment. Based on this inference, making similar attempts with full-length follow-up durations is both recommendable and remunerative.

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Conflict of interest

The authors declare they have no conflict of interest in this study.

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Data availability

The raw data supporting the conclusions of this article are available from the authors upon reasonable request.

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