ORIGINAL ARTICLE

Comparison of the Effect of Multimedia and Booklet Methods on Quality Of Life of Kidney Transplant Patients: A Randomized Clinical Trial Study

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ABSTRACT

Background: Proper education can improve the quality of life. Multimedia as an interactive educational method and booklet as a traditional one have their own unique effects. This study aimed at compare the interactive multimedia and booklet methods at the time of discharge on the quality of life of kidney transplant patients.

Methods: In this single-blind interventional study, 80 patients from Bouali Hospital, Shiraz, from September 2017 until June 2018 were selected by convenience sampling, and then divided into two groups (booklet and interactive multimedia) by block randomization. Intervention for the first group included short and long-term care information in the form of a booklet, and an interactive multimedia CD with the same content for the second group. Quality of life was assessed by kidney transplant questionnaire (KTQ) at the time of discharge and after two months. Adherence to education was verified by phone. The data were analyzed through SPSS v.24 software using independent and paired t-tests. $P<0.05$ was considered significant.

Results: The mean overall quality of life score in both groups increased significantly, $P=0.044$ for the booklet group and $P=0.039$ for the multimedia group. In emotional, fatigue, uncertainty/fear domains, both groups showed improvement after the intervention ($P<0.05$). However, in physical symptoms and appearance domains, differences were not significant, before and after education. After intervention, no significant difference was observed between the two groups in the overall and specific domains of quality of life score ($P=0.437$).

Conclusion: Both methods had positive impacts on the quality of life and emotional, fatigue and uncertainty/fear domains.

Trial Registration Number: IRCT201608272950N1

KEYWORDS: Education, Educational booklet, Kidney transplantation, Multimedia, Quality of life

INTRODUCTION

Disorders in renal function might lead to its failure that can be divided into acute and chronic types.[1] The prevalence of chronic kidney disease in the United States is about 10%. Since there is 5-6% increase in the number of end stage renal disease (ESRD) patients in the world, as compared to the world's population growth (1.1%), the disease can be considered as one of the most important health concerns.[2] Different studies in Iran reported 6 to 17% prevalence for Chronic Kidney Disease (CKD).[3] In ESRD, the patient is limited to using renal replacement therapy, including hemodialysis, peritoneal dialysis or transplantation.[4] Since the ESRD reduces life expectancy, the treatment of choice is kidney transplantation,[5] which leads to improved physical and mental health.[6] Despite the advantages of kidney transplantation and improvement in the quality of life (QoL) compared to dialysis patients,[7] the patients encounter new challenges after discharge.[8, 9] Amongst them are adherence to a complex therapeutic and pharmaceutical regimen,[10] regular clinical examinations, change in lifestyle (nutrition, exercise and weight control), having to carry a foreign object, difficultly with daily routine, uncertainty and stress, emotional concerns, and lack of knowledge regarding drugs and nutrition.[11, 12] Health-related QoL is an important factor when evaluating kidney transplant patients, which is an indicator of graft survival.[5] One of the most effective ways to improve QoL is through education.[13] Advancement in the health care system and the use of modern educational techniques are essential in achieving high quality care by promoting health outcomes.[14, 15]

Educational booklets are widely used as the first generation of self-directed learning media. However, during their preparation, readability for the target group, presence of simple pictures and diagrams, boldfacing important words and phrases, including up-to-date information, and using reliable sources have to be considered. Meanwhile, previous studies reported the insufficiency of educational booklets, suggesting e-learning as a more favorable choice.[16]

In recent years, electronic multimedia have played a significant role in education.[17] Multimedia learning integrates multiple means such as texts, graphics, films, animations and audio tracks to present and deliver information. These forms of multimedia enrich the learner's understanding and makes them interact with the content more efficiently.[18] Improving the patients' knowledge regarding their condition has valuable outcomes, such as self-efficacy, behavioral changes and improved QoL. Various studies in Iran and around the world have pointed out the flaws and weaknesses from quantity and quality standpoints of education. In previous researches on QoL of kidney transplant patients that were conducted in Iran, general tools for QoL were used, and the majority of the studies had focused on the effect of education on adherence to treatments and weight gain. While the QoL of patients were only analyzed in descriptive method or it was compared with dialysis patients,the effect of educational intervention or interactive multimedia on QoL was not discussed extensively.[19-21] Studies have shown that self-care knowledge of transplant patients is not adequate; thus, holding educational programs can be effective. Although studies were performed on various issues associated with kidney transplant recipients, the effects of different educational methods such as booklet as a common and traditional method or multimedia CDs as an interactive and modern method on QoL were not discussed. Therefore, the present study aimed to compare the effect of interactive multimedia versus booklet methods at the time of discharge on the QoL of patients who had undergone kidney transplant surgery.

MATERIAL AND METHODS

This single-blind interventional study was designed to compare the effect of interactive multimedia vs. booklet educational methods on the QoL of kidney transplant patients from September 2017 until June 2018 in Shiraz,

Iran. The participants consisted of renal failure patients who had undergone kidney transplant surgery. The inclusion criteria were age 18-65 years, having a DVD player at home, being able to read and write in Persian, not having any mental illness, and not having any formal education on the subject. In case of lack of willingness to continue cooperation at each stage of the study, presence of problems and complications associated with the transplant requiring readmission or presence of severe psychological illness during the study, the participants were excluded from the study.

Since there was no similar publication, the reports of Tayyebi and Rostami were used to calculate the SD for KTQ-25 inventory.[22, 23] Therefore, based on a confidence level of 95%, power of 80%, a minimum score increase of 0.7 and expected standard deviation of 1, 33, the participants were determined in each group, and considering the dropout rate, 40 people were selected for each group, using the following formula

$$n = \frac{2\sigma^2(z_{1-\alpha/2} + z_{1-\beta})^2}{d^2} = \frac{2(1.96 + 0.84)^2}{0.7^2} = 33$$

From each group, one participant was excluded due to lack of willingness to continue or readmission to hospital. Eventually, a total of 78 individuals (39 per group) participated in our study. Consort diagram shows the study participants (Figure 1).

80 individuals who were eligible to enter the study were selected based on convenience sampling, and then divided by block randomization into two groups of interactive multimedia education and educational booklet. Sampling was conducted as follows: First, by flipping a coin, it was decided that Group A be the booklet group and Group B as the CD group. Next, forty numbers were randomly selected from the table of randomized numbers by a computer. Also, forty double blocks were used for sampling, followed by determining AB and BA states. In the event that the selected number from the table was 0-4 (unit digit of 0-4), it was regarded as AB, and if it was 5-9 (unit digit of 5-9), it was considered BA.

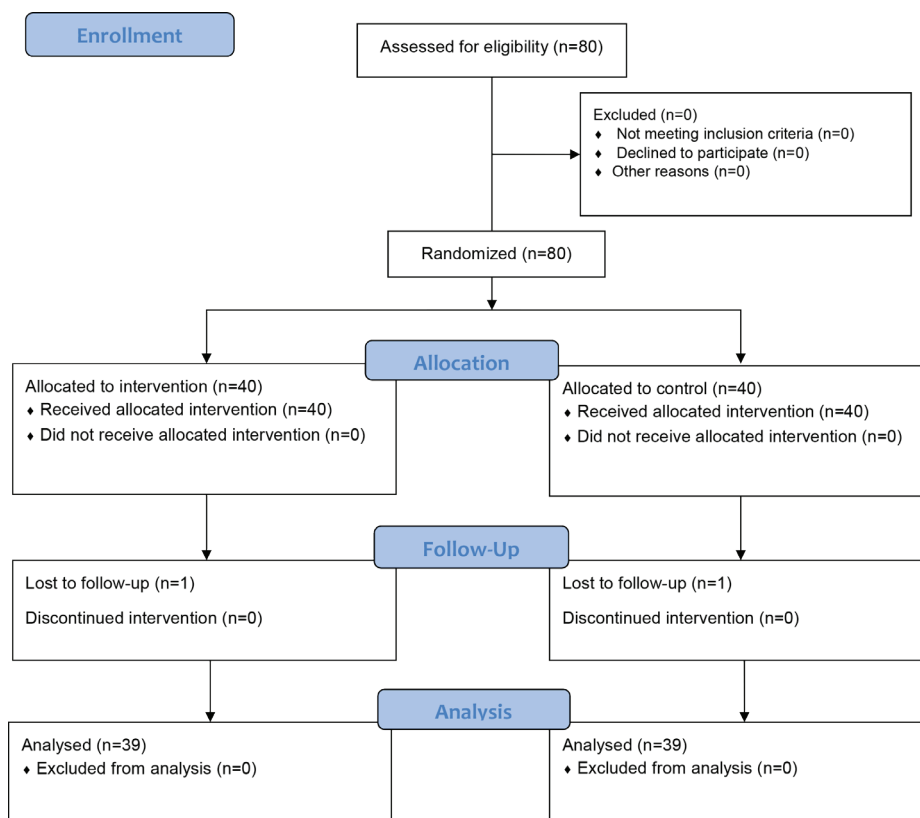In this study, the tools used were demographic characteristics questionnaires

Figure 1: CONSORT Flow Diagram of participants

as well as a 25-question quality of life questionnaire for kidney transplant patients (KTQ-25). The demographic information included age, gender, marital status, level of education, occupational status, place of residence, pre-existing illness at the time of transplant operation, illness leading to the transplant, duration of kidney failure, date of transplant, type of dialysis before the transplant and type and dose of consumed drugs. The KTQ-25 was introduced in 1993 by Laupacis et al. in Canada. A combination of factor analysis and clinical judgment was then used to create the final questionnaire which consists of 25 questions in 5 dimensions (physical symptoms, fatigue, uncertainty/ fear, appearance and emotions). Its internal reliability was reported to be between 0.82 and 0.91,[24] while its validity was r≥0.7.[25] This questionnaire has been widely used in other countries. In a study in Spain, its reliability using Cronbach's alpha was between 0.63 and 0.85.[26] Its validity and reliability were also assessed in the Persian version, and it was used in Iran to measure the QoL due to special problems that transplant patients have to face.[22] The Persian version was prepared by Tayyebi et al. and then its face and content validity was approved by experts. Its reliability value was obtained by distributing the questionnaire among 25 individuals similar to the target population and the internal reliability was found to be 0.93.[23]

The questionnaire has 25 questions in 5 domains, namely physical symptoms, fatigue, fear/uncertainty, appearance and emotion.[27] Each category receives a score of 1 to 7, i.e. 7 indicates the best score (highest quality) and 1 the worst score (lowest quality). Overall in each field, 7 shows the highest QoL and 1 represents the lowest QoL. The order of the questions in the questionnaire are as follows: questions 1-6 (physical domain), 7-10 (appearance), 17-20 (fear and uncertainty), and 12-14, 16, 21, and 22 (emotion), and 11, 15, 23-25 (fatigue). In each domain, the highest and lowest score were 7 and 1, respectively. The sum of scores in each domain was

calculated and divided by the number of its items to obtain the final score of each domain. The overall QoL score was also calculated by dividing the sum of domains' scores by the number of domains. Hence, this score would also take a value between 1 and 7.

The study was approved by the local Ethics Committee of Shiraz University of Medical Sciences (IR.SUMS.REC.1395.107). At first, the interactive multimedia content, which included the function of kidney, chronic renal failure, kidney transplantation, complications and rejection of transplant, drug therapy, nutrition, exercise, return to work, personal hygiene, prevention of infection, sexual problems, pregnancy and daily care after transplantation, was prepared by reviewing the literature and post-transplant educational texts. The scenarios were set based on the literature review and assessed by experienced and qualified nurses in the transplant ward, a number of nursing school faculty members, and nephrologists. Then, the content was designed by the electronic department. Then, voice recording was carried out. An interesting voice was selected for the audio, and images and animations included 26 educational parts and 28 multiple-choice and true-false questions. The users were guided to the next stage if they answered the questions correctly, and in the case of wrong answers, they were able to view the content again. At the same time, the booklet was properly arranged and edited by adherence to the principles of designing educational content similar to what was offered in the CDs. It was prepared in the form of an illustrative, colorful and attractive booklet in 58 pages in A5 size glossy paper. Before the intervention, all the participants signed the written informed consent, filled out the demographic questionnaire, and the KTQ-25 forms were distributed amongst the participants to ensure that there was no significant difference between them. Afterward, the educational interactive multimedia CD and booklet were given to Groups A and B under the education and supervision of the researcher at discharge

time. During the following two months, their questions were answered by phone and after two months KTQ-25 was filled out again. It should be noted that the cell phone number of the second author of this article was given to the participants. They asked about their issues or problems. Their problems were answered and followed by the second author who was expert in this regard. Then, data analysis was performed by SPSS version 24, using Chi-square test and paired and independent t-tests.

RESULTS

The analysis by kolmogorov Smirnov test showed normal distribution of the variables before and after the intervention. The majority of the participants were male (71.4%). Minimum and maximum ages were 20 and 64 years, respectively with a mean of 39.47 years. The mean age of the booklet group was 40.03±11.60 and that of the multimedia group was 38.92±12.25 years, and the difference was not significant. The minimum duration of renal failure before transplantation was 1 year and the maximum was 30 years.

The mean values of the above mentioned quantity were 6.93 for Group A and 6.05 for Group B. The two groups were also compared in terms of gender, marital status, level of education, occupation, place of residence, cause of renal disorders, kind of dialysis before operation, and type of transplanted kidney. The results showed that there was no significant difference between the two groups based on all of the mentioned characteristics (P>0.05) (Tables 1, 2).

It was seen that hypertension and diabetes mellitus were the two main causes of ESRD. In Group A, 15.38% had diabetes and 30.77% had high blood pressure, while these values were 10.26% and 41.02% for Group B. Therefore, no significant difference was found between the groups regarding the cause of renal disorder (P>0.05). Nephritic syndrome, use of non-steroid analgesics and poly-cystic kidney were the next contributing causes. In terms of transplant type, kidneys donated by brain death patients comprised the highest number. In 33 patients of each group, hemodialysis controlled the ESRD symptoms before the transplantation

Before the intervention, no significant difference was seen between the two groups with respect to the mean score of total QoL and its domains. For Group B based on paired t-test, it was observed that the overall QoL score and the scores of emotion, fatigue and

Table 1: Demographic characteristics of the participants in terms of frequency distribution and percentage

Group		Booklet		Multimedia		P value*
Variable		**Frequency**	**Percent**	**Frequency**	**Percent**	
Gender	Man	28	71.79%	27	69.23%	0.665
	Woman	11	28.21 %	12	30.77%	
Marital status	Single	7	17.95%	9	23.08%	0.832
	Married	29	74.36%	28	71.79%	
	Divorced	2	5.13%	2	5.13%	
	Widow	1	2.56%	0	0%	
Educational level	Below diploma	24	61.54%	29	74.36%	0.188
	Diploma	5	12.82%	2	5.13%	
	University education	9	23.08%	8	20.51%	
	Missed	1	2. 56%	0	0%	
Duration of renal failure before operation	Less than 1 years	7	17.95%	8	20.51%	0.964
	1-5 years	13	33.34%	14	35.90%	
	6-10 years	9	23.08%	7	17.95%	
	11-15 years	6	15.38%	5	12.82%	
	More than 15 years	3	7.69%	2	5.13%	
	Missed	1	2.56%	3	7.69%	

*Chi-square test

Table 2: Individual characteristics of the participants in terms of frequency distribution and percentage

Group		Booklet		Multimedia		P value*
Variable		Frequency	Percent	Frequency	Percent	
Cause of renal disorder	Hypertension	12	30.77%	16	41.02%	0.739
	Diabetes	6	15.38%	4	10.26%	
	Nephritic syndrome	4	10.26%	3	7.69%	
	Other reasons	17	43.59%	16	41.03%	
Kind of transplanted kidney	Alive	3	7.69%	1	2.56%	0.352
	Dead	34	87.18%	38	97.44%	
	Missed	2	5.13%	0	0%	
Kind of dialysis before operation	Hemodialysis	33	84.62%	33	84.62%	0.780
	Peritoneal	5	12.82%	6	15.38%	
	Missed	1	2.56%	0	0%	
Employment status	Employee	8	20.51%	8	20.52%	0.536
	House keeper	2	5.13%	6	15.38%	
	Freelance	18	46.16%	18	46.16%	
	Retired	0	0%	0	0%	
	Unemployed	8	20.51%	6	15.38%	
	Missed	3	7.69%	1	2.56%	
Housing status	Sole ownership	25	64.10%	21	53.85%	0.285
	Tenancy	13	33.34%	18	46.15%	
	Missed	1	2.56%	0	0%	

*Chi- square test

uncertainty/fear changed significantly after the intervention. In physical symptoms and appearance domain, no significant difference was seen when we compared pre-post-intervention scores. Group A had a similar improvement in overall QoL and emotion, fatigue and uncertainty/fear scores, and no significant difference in physical symptoms and appearance areas. After the intervention, independent t-test yielded no significant difference between the two groups in the scores (P>0.05) (Table 3).

DISCUSSION

Based on the obtained results, the intervention led to an increase in the scores of overall QoL and all the domains, except for physical symptoms and appearance in both two groups. In other words, it can be concluded that both educational methods benefitted from optimal effectiveness.

Our study showed that hypertension and diabetes mellitus were the two main causes of ESRD. Another study also showed that 57% of the patients had uncontrolled blood pressure and 43% had diabetes.[28]

Our results showed no significant difference in the QoL scores between the two groups before the intervention. The statistical comparison of the QoL scores between the pre-post-intervention stages of the booklet group showed that the overall QoL score and the emotional, fatigue and uncertainty/fear scores changed significantly after the intervention; thus, it can be claimed that the educational booklet was effective in these domains by improving the QoL of patients. In physical symptoms and appearance domains, no significant difference was observed between the pre-post-intervention results. Comparing the results of the multimedia CD group from pre-post-intervention stages showed that the differences in the overall QoL score and the emotional, fatigue and uncertainty/fear scores between the two stages were significant, and in the domain of physical symptom and appearance they were not significant. This suggests the positive impact of multimedia education on the QoL of patients.

Considering the aforementioned scores, the two approaches similarly improved the overall QoL score and the three individual scores of emotion, fatigue and uncertainty/

Table 3: Comparison of scores of overall QOL and its domains in the two groups and between them before and after the intervention

Areas of quality of life	Group	Before intervention	After intervention	P value*	Mean change	P value**
		Mean±SD	Mean±SD			
Physical symptoms	Booklet	3.78±1.21	3.28±2.04	0.215	-0.5±1.62	0.745
	Multimedia	3.90±1.80	3.27±1.99	0.152	-0.63±1.89	
	P value	0.730	0.797			
Appearance	Booklet	5.87±1.24	5.64±2.48	0.601	-0.23±1.86	0.758
	Multimedia	5.91±1.29	6.26±1.83	0.303	0.35±1.56	
	P value	0.889	0.318			
Emotion	Booklet	4.34±1.67	5.27±2.28	0.046	0.93±1.97	0.626
	Multimedia	4.46±1.74	5.60±1.90	0.006	1.14±1.82	
	P value	0.756	0.376			
Fear	Booklet	3.91±1.76	5.22±2.39	0.006	1.31±2.07	0.194
	Multimedia	3.80±1.88	5.69±1.80	<0.001	1.89±1.84	
	P value	0.790	0.332			
Fatigue	Booklet	4.63±1.68	5.56±2.13	0.033	0.93±1.90	0.155
	Multimedia	4.54±1.76	6.08±1.94	<0.001	1.54±1.85	
	P value	0.817	0.530			
Quality of life(overall)	Booklet	4.53±1.10	5.17±1.49	0.044	0.63±1.29	0.894
	Multimedia	4.53±1.26	5.20±1.46	0.039	0.67±1.36	
	P value	0.914	0.437			

*Paired t-test, **Independent t-test

fear. These findings are consistent with a quasi-experimental study on the effect of educating the nursing students about hospital acquired infections by booklet and multimedia CD methods, which showed that the two methods had a significant positive effect on knowledge and attitude regarding hospital-acquired infections.[29]

Another study that confirmed our results compared the effect of educational software and training booklet on maternal self-efficacy and infant care behavior amongst Iranian mothers. This research showed a significant increase in the mean score of maternal self-efficacy in the booklet and software groups compared to the control group. However, no significant difference was observed between the two intervention groups.[30]

Also in line with our findings which showed the effectiveness of multimedia method, assessment of the effect of e- learning program at the quality of life of patients with coronary heart disease showed that the patients who were educated by e-learning method had better quality of life related to physical function and bodily pain at post-intervention phase compared with the control group.[31] Another research is in agreement with our findings, which reported that the computer-based educational package improved QoL of adolescents with epilepsy.[32] The findings of our study were also in agreement with those of a study that showed teaching heart failure patients self-care by computer and booklets increased knowledge in both groups.[33]

On the contrary, another investigation that had compared the effect of e-learning and educational booklet on childbirth self-efficacy revealed that the mean score of childbirth self-efficacy in the e-learning group had significantly increased compared to the booklet group.[34]

Our results were also different from those of a study that focused on the effect of electronic and paper booklets on women's satisfaction with postpartum care. They reported better performance of electronic booklet in comparison with paper booklet.[35]

In addition, our findings were not consistent with those of another study that had evaluated the multimedia,[36] and a study which found that education by audio CD can improve the health of patients undergoing

coronary bypass surgery in various aspects.[37] The differences in the results of the mentioned studies can be multifactorial. In our research, booklet had attractive illustrations on glossy paper that might have affected the patient's attitude as much as multimedia. To the best of our knowledge, there is no interventional study with exact similar tools to verify the results of our study. However, it was observed that fatigue, lack of energy and weakness disappeared after transplantation, which is clearly seen in the corresponding scores two months after the intervention.

Appearance and physical problems after transplantation, even with education, can be attributed to the effects of immunosuppressive therapy.[38] A study in Japan reported that more than half of the kidney transplant patients had glucose intolerance after the surgery and returned to normal after a year. Complications such as diabetes and increased appetite following the use of high dose prednisolone several months after the transplantation contribute to appearance changes.[39] Therefore, developing an evidence-based self-care program for patients in the first year after transplantation with a focus on prevention of weight gain and adherence to a drug regimen is of high importance.[40]

This study achieved success in presenting effective education and follow up with the aim to increase knowledge. The content and design of CD and booklet were attractive, useful and comprehensive, so that the participants were enthusiastically in contact with the researchers to inquire about the optimal utilization of the multimedia CD and booklet.

One limitation of this study was lack of access to higher number of participants, which was due to limited time dedicated to this research. Moreover, factors influencing learning, such as personal, cultural, economic and physical differences, might have affected the results of the study.

Conclusion

The results indicated that the intervention led to increased scores of overall QoL, emotion, fatigue and uncertainty/fear in both groups (booklet and multimedia CD). It should be noted that there were no significant changes in the score of appearance and physical symptoms domains in comparison to pre-post-intervention states. No significant difference was observed between the two groups in the scores of overall QoL and any specific domains. Hence, it can be concluded that both methods were desired with similar efficacy. It is, therefore, suggested that nurses educate the kidney transplant patients, using multimedia and booklet to improve their health status and quality of life that ultimately results in better health status of the community.

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