Medical - Surgical Nursing Journal 2017; 6(2-3): 37-43.

Published online 2018 May 9 Original Article

# Effect of care plan based on Roy adaptation model on physiological adaptation in patients with thalassemia major

**Fariba Yaghoubinia[1], Ali Navidian[2], Nazanin Yousefian[3], Fatemeh Chaji[4]**

1. Assistant Professor, Community Nursing Research Center, Zahedan University of Medical Sciences, Zahedan, Iran
2. Associate Professor, Pregnancy Health Research Center, Zahedan University of Medical Sciences, Zahedan, Iran
3. Insructor, Community Nursing Research Center, Zahedan University of Medical Sciences, Zahedan, Iran
4. MSc Student of Critical Care Nursing, School of Nursing and Midwifery, Zahedan University of Medical Sciences, Zahedan, Iran

***Correspondence*: Fatemeh Chaji, School of Nursing and Midwifery, Zahedan University of Medical Sciences, Zahedan, Iran.
Email: fatemehchaji@yahoo.com**

ARTICLE INFO

**Article history:**

**Received: 16 June 2017**
**Revised: 18 December 2017**
**Accepted: 19 March 2018**

**Key words:**

**Adaptation**
**Physiological adaptation**
**Thalassemia major**

**ABSTRACT**

**Background:** Patients with thalassemia major are faced with many physical and physiological problems, reducing the adaptation level of this population. Given the fact that the use of nursing theories, especially the adaptation model developed by Roy, play an effective role in turning incompatible behaviors into adaptive ones, this study aimed to determine the effect of Roy adaptation model on physiological adaptation in patients with thalassemia major.

**Methods:** This quasi-experimental study was conducted on 80 patients with thalassemia major, who referred to one of the hospitals of Zahedan, Iran, in 2015. The study population was selected through convenience sampling technique, and then randomly assigned into the intervention and control groups. The intervention group was subjected to three 60-minute sessions of care plan based on Roy adaptation model. Data collection was carried out using demographic characteristic form and Roy adaptation model assessment form before and two months after the intervention. The data were analyzed in SPSS software (version 22) using Chi-square test, as well as independent and paired t-tests.

**Results:** According to the results, the mean scores of physiological adaptation in the intervention and control groups were 89.53±13.8 and 88.73±13.4, respectively, before the intervention. However, these mean scores increased to 100.1±15.2 and changed to 88.68±12.6 in the intervention (P<0.001) and control (P=0.79) groups after the intervention, respectively. There was a significant difference between the study groups in terms of the mean adaptation score (P=0.001).

**Conclusion:** As the findings of this study indicated, the care plan based on Roy adaptation model could promote the level of physiological adaptation of patients. Therefore, this model can be used to improve the physiological adaptation of the patients with thalassemia major.

## 1. Introduction

Thalassemia is a congenital autosomal recessive disorder resulting from defects in the production of globin chains. This disease is the most common hereditary single gene disorder, mostly observed in the Southeast Asia and the Mediterranean countries.[1, 2] According to a report by the World Health Organization (WHO), more than 15 million people are diagnosed with this disease worldwide. However, Iran with 25,000 thalassemia major patients has ranked first in this regard.[3]

With a population of 2,700,000, the southeastern region of Iran has 23,000 patients with thalassemia major (i.e., 85 individuals per 100,000 people), which is a considerable amount and requires more attention.[4] Thalassemia major, similar to any other chronic disease, affects various aspects of patient's life. In spite of the established therapeutic measures, the symptoms and clinical manifestations of this disease cause various physical problems for the patients.[3] Moreover, adults with thalassemia major are faced with occupational problems, as well as difficulties in finding a spouse and forming a family (due to infertility).

Meanwhile, the lack of proper adaptation with the disease increases the problems of the patients in

different dimensions of life.[5] Ineffective adaptation reduces the quality of life and increases the treatment costs.[6] Therefore, it is important that nurses be able to use scientific and clinical approaches based on adaptation theories to deal with the problems of these patients.[7]

Adaptation is regarded as a positive response to stimuli.[8] The main goal of the human system is the maintenance of integrity in dealing with environmental stimuli, which leads to the achievement of optimal health and welfare, as well as high quality of life and death with dignity.[9] One of the extensively used nursing models for chronic diseases is Roy adaptation model.[10] The main concept of this model is adaptation; accordingly, the nursing goal of this model is to improve the adaptation in four modes of physiologic needs, self-concept, role function, and interdependence.[6] In this model, responses to stimuli are expressed in physiological and psychological modes.[11]

The application of the Roy adaptation model in the treatment process of chronic diseases is an important factor for the attraction of patient's participation in the treatment and contribution to healthcare decision-making process by the nurses.[12] As a result, emphasis on nursing intervention is of fundamental importance in improving the adaptation of patients in various aspects. In this regard, there are several studies investigating the interventions that can improve the adaptation levels in patients with chronic diseases.

Sadeghnezhad Forotaghe et al. (2011) reported that the Roy adaptation model resulted in a significant reduction in the level of incompatible behaviors and glycosylated hemoglobin among diabetic patients.[12] Furthermore, Naeem Hasani et al. (2014) marked a significant increase in the mean score of the mental adaptation of patients with cardiac failure in the intervention group.[13] In another research performed by Fazel Asgharpoor et al. (2012), it was indicated that the Roy adaptation model had a positive effect on the daily activities of hemodialysis patients.[14]

Considering the high prevalence of thalassemia major in Iran, it is important to pay attention to the different life aspects of these patients. Moreover, the adaptation problems in these patients and the importance of promoting adaptive behaviors in coping with physiological problems (e.g., defects in physical activity, school performance, and social life, as well as financial burden of therapies in family, occupational problems, and difficulties in finding a spouse and forming a life) necessitates the use of solutions to improve adaptation in these patients.

There are different studies indicating the effect of education on the physiological and psychological outcomes of patients with thalassemia major. However, to the extent of the researchers' knowledge, there is no study investigating the effect of care plan based on Roy adaptation model on the adaptation level of these patients. With this background in mind, the present study aimed to determine the effect of care plan based on Roy adaptation model on the physiological adaptation of the patients with thalassemia major.

## 2. Methods

### *2.1. Design*

This quasi-experimental study was conducted on patients with thalassemia major, who referred to one of the hospitals of Zahedan, Iran, during July-November 2016 to receive blood.

### *2.2. Participants and settings*

Sample size was estimated as 36 individuals in each group according to the results obtained by Farsi et al. (2016)[15] and sample size formula ($X_1$=20.3, $X_2$=18.13, $S_1$=2.42, $S_2$=3.18, $Z_{1-\beta}$=1.28, $Z_{1-\alpha/2}$=1.96) with the test power of 90%, as follows:

$$\frac{(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta})^2 (S_1^2 + S_2^2)}{(\bar{X}_1 - \bar{X}_2)^2}$$

However, a total of 80 subjects were selected (i.e., 40 cases per group) considering 10% sample loss. The patients were selected through convenience sampling technique based on the inclusion criteria. Subsequently, the lottery and coin-toss methods were applied to divide the subjects into the intervention and control groups based on their weekly referrals in order to prevent communication between the research units. To this end, the patients who referred to the hospital to receive blood during the first week were allocated to the control group, and those referring to the hospital in the second week were assigned into the intervention group.

The inclusion criteria were: 1) age of > 18 years, 2) confirmed diagnosis of thalassemia major according to the medical record, 3) a minimum of elementary education, 4) lack of apparent physical or mental disorders, 5) no history of hospitalization in mental wards, 6) no drug abuse, and 7) absence of auditory or visual impairments that might prevent communication with the researcher. On the other hand, the exclusion criteria were absence from the intervention session and possession of an acute and critical condition preventing the subject from participating in the study. It is noteworthy that the mentioned information was obtained through

observation, interviews, and the review of the medical records of the subjects.

### 2.3. Instruments

In this study, the data collection was performed using a demographic characteristic form (including data on gender, level of education, and age) and Roy adaptation model assessment form in physiological mode. The Roy adaptation model assessment form in the physiological dimension contains 28 items on the relationship with oxygenation, activity, rest, nutrition, defecation, as well as blood, fluid and electrolyte circulation. This form was applied by Alimohammadi et al. (2015) on patients with strokes, confirming its reliability at the Cronbach's alpha of 76.6.[16]

Therefore, in the current study, the Roy adaptation model assessment form in the physiological dimension was designed based on the physiological needs of the patients with thalassemia. Accordingly, the validity and reliability of this form were investigated. In addition, the number of items changed to 29 cases, and scoring was performed on a five-point Likert scale (i.e., never=0, rarely=1, sometimes=2, often=3, and always=4). The items of 16-19, 21-23, and 25 were scored reversely (i.e., never=4, rarely=3, sometimes=2, often=1, always=0).

The score range of this form is 0-116, where a higher score is indicative of improved adaptation. The content validity of the form was confirmed by 10 faculty members of Nursing and Midwifery School of Zahedan University of Medical Sciences, Zahedan, Iran. In addition, the reliability of this instrument was confirmed at the Cronbach's alpha of 0.87 by performing a trial on 10 patients with thalassemia major, who were not among the participants of the research.

### 2.4. Data Collection

After the allocation of patients into two groups of intervention and control, the Roy adaptation form was immediately filled out by the participants. Subsequently, the subjects of the intervention group were informed to attend educational classes executed at the hospitals in the next week. During this time, plans were made regarding the establishment of the class, educational content, and needs of the patients.

In the next step, the obtained data were analyzed in order to detect the incompatible behaviors and determine their stimuli. Subsequently, the care plan was designed for the intervention group based on the Roy adaptation model to modify the incompatible and stimulating behaviors with an emphasis on adaptation methods. On the other hand, the control group received no intervention and referred to the selected center for the monthly program of receiving blood, desferal injection, and normal education of the ward. The designed care plan was implemented in form of three 60-minute educational face-to-face group sessions (groups of 5-8 members) with question/answer and use of educational aid tool of PowerPoint by the researcher in one of the classes of the selected hospital.

The educational content of the first session included the introduction of thalassemia major disease, as well as the symptoms, signs, complications, and importance of treatment of this disease. In the second session, the physiological complications and associated care of thalassemia major, as well as methods of adaptation with the physiological complications of this disease in various body systems were covered with a higher emphasis on incompatible behaviors, which were previously determined in the evaluation stage. The third session included the contents related to the way of performing daily activities, exercise and self-care, nutrition and dietary regimen, sleep and sufficient rest, and education of adaptive behaviors.

Furthermore, the information that the subjects required was determined based on their problems in the evaluation stage and added to the content. It should be pointed out that at the beginning of each session, a review of the contents presented in the previous session was carried out. Two months after the intervention, the Roy adaptation model assessment form in the physiological dimension was completed again by both study groups.

Within the time interval of the end of the intervention to the posttest, the subjects were provided with the phone number of the researcher to ask their questions. In addition, telephone follow-up was made by the researcher. Moreover, at the end of the sessions, educational booklets containing the contents presented in the sessions were provided for the patients (Diagram 1).

### 2.5. Ethical considerations

This study was performed after obtaining approval from the Ethics Committee of the university on July 17th 2016 with the code of IR.ZAUMS.REC1395.132. After sampling, the research objectives were explained to the participants, and written informed consent was obtained. In order to adhere to the ethical considerations, at the end of the study, educational booklets were provided for the subjects of the control group as well. Furthermore, the participants were ensured about the anonymity and confidentiality terms regarding their personal

information. In addition, the subjects were informed about the possibility of study withdrawal at any stage of the research.

### *2.6. Statistical analysis*

Data analysis was performed in SPSS (version 22) using descriptive statistics, Chi-square test, as well as independent and paired t-tests.

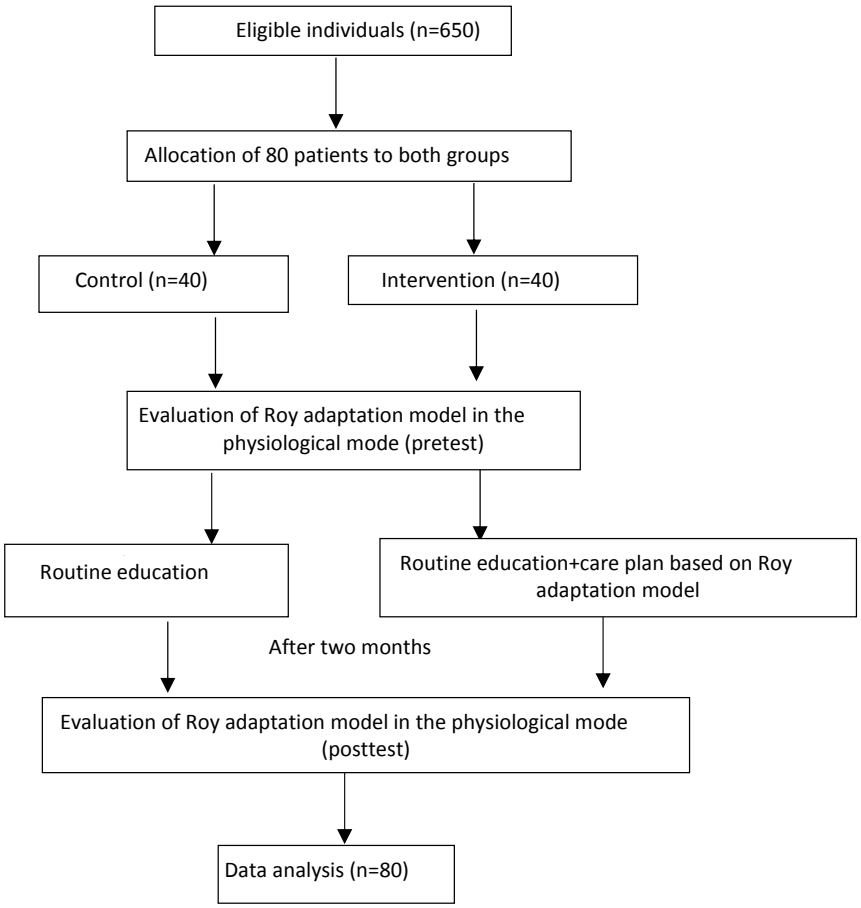


**Diagram 1**. Implementation stages of research

## 3. Results

The demographic characteristics of the subjects are presented in Table 1, according to which no significant difference was observed between the intervention and control groups in this regard. In addition, there was no statistically significant difference between the two groups regarding the mean score of the physiological dimension prior to the intervention (P=0.79). However, the mean score of physiological adaptation level of the subjects in the intervention group significantly increased after the intervention (P<0.001). The results of the independent t-test revealed a significant difference between the two groups in this regard at the post-intervention stage (Table 2).

**Table 1.** Demographic characteristics of the intervention and control groups

| Variable | | Intervention group N(%) | Control group N(%) | P-value |
|---|---|---|---|---|
| **Gender** | Male | 21(52.5) | 18(45) | *0.502 |
| | Female | 18(47.5) | 22(55) | |
| **Level of education** | Primary education | 26(65) | 25(62.5) | *0.96 |
| | Junior high school | 7(17.5) | 8(20) | |
| | Diploma and above | 7(17.5) | 7(17.5) | |
| **Age** | Mean±SD | 22.8±3.6 | 24.4±4.2 | **0.061 |

*Chi-square test, ** Independent t-test

**Table 2**. Comparison of mean scores of physiological adaptation level in patients with thalassemia major in the control and intervention groups before and after the intervention

| Variable / Time | Before intervention | After intervention | P-value* |
|---|---|---|---|
| | Mean±SD | Mean±SD | |
| **Intervention** | 89.53±13.8 | 100.1±15.2 | <0.001 |
| **Control** | 88.73±13.4 | 88.68±12.6 | 0.89 |
| **P-value**** | 0.79 | <0.001 | |

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

## 4. Discussion

According to the results of the present study, the care plan based on Roy adaptation model increased the score of physiological dimension of adaptation in the patients with thalassemia major. Accordingly, the results of other studies have demonstrated that education based on this model can affect the incompatible behaviors of patients with chronic diseases, such as stroke, dialysis, and multiple sclerosis.

The positive effects of care plans based on Roy adaptation model on other chronic diseases have been also confirmed. In this respect, Alimohammadi et al. (2015) marked that the care plan based on Roy adaptation model improved the physiological adaptation level of patients with stroke.[16] Despite the difference in the study population investigated by Shariari and that of the current study, it seems that the detection of incompatible behaviors based on Roy model and education can affect the enhancement of adaptive behaviors regardless of the type of disease. In addition, in a study conducted by Afrasiabifar et al. (2013), the Roy adaptation model was introduced as an effective factor in the promotion of physiological adaptation level and self-concept in hemodialysis patients.[10] Likewise, Frazão et al. (2013) marked that the application of Roy nursing model in hemodialysis patients improved the individual adaptation and integrity.[17]

In a study conducted by Hassani et al. (2012) on hemodialysis patients, it was concluded that the adaptation level in the physiological dimension increased.[18] While the mentioned studies were performed on hemodialysis patients, their results are in line with our findings. This can be due to the fact that hemodialysis and thalassemia are both among the chronic diseases. The patients inflicted with such diseases are involved in long-term and continuous treatments and experience disease complications, which result in their ineffective adaptation in each dimension of compatibility, and therefore requirement for interventions, such as Roy adaptation model.

In a study conducted on the patients admitted to Intensive Care Unit by Hamzehpour et al. (2018), it was concluded that the level of consciousness as a behavior in the physiological dimension increased after three days of care plan based on Roy adaptation model. In this regard, our findings are in congruence with the mentioned results. Quoted from Roy, Hamzepour stated that physiological adaptation is one of the factors that can reduce the complications caused by the disease.[19] As mentioned above, patients with thalassemia have various physical and psychological complications, which can be mitigated using Roy adaptation model.

In a study performed by Hemmati Maslakpak et al. (2016), Roy adaptation model reduced fatigue impacts as one of the symptoms and adaptive behaviors of patients with multiple sclerosis.[20] Despite the difference in the research unit of the aforementioned study with that of our study, the results obtained by Hemati et al. are consistent with

our findings, confirming the positive effect of Roy adaptation model on the physiological adaptation level of the patients.

This might be due to the fact that the improvement of patient specific-nursing interventions leads to positive results in the patients attempting to adapt to the disease-associated problems. In the present study, the fatigue of the patients with thalassemia had a significant reduction after the intervention, compared to that before the intervention.

Sadeghnezhad Forotaghe et al. (2010) conducted a study to determine the effect of care plan based on Roy adaptation model on the level of physiological adaptation of patients with diabetes type II. According to their results, the use of the designed program based on Roy adaptation model had a positive impact on the enhancement of the physiological adaptation of patients with diabetes type II.[12]

Although the mentioned studies were performed on other patients, their results are in line with our findings. This can be ascribed to the fact that all the investigated patients were inflicted with chronic diseases (e.g., thalassemia, diabetes, and cardiac failure) dealing with long-term and permanent complications and treatments, and therefore having a low level of adaptation, which requires nursing measures, such as Roy adaptation model.

In a research carried out by Sadeghnezhad Forotaghe based on Roy adaptation model, self-control was marked as one of the important aspects of a chronic disease. Generally, the patients with a chronic disease require to learn some behaviors to control their disease. The care of a patient with chronic disease should involve the induction of changes in the behavior of patients to create compatible behaviors. These behaviors are affected by different stimuli, the manipulation of which based on care and educational models increases the level of adaptation, and results in the better control of the disease.[12]

In a research conducted by Rosińczuk (2015) et al. on patients with multiple sclerosis, the use of Roy nursing model was reported to improve the physical satisfaction of the patients with chronic diseases and increase the chance to achieve skills to deal with physical and physiological problems.[21]

Nonetheless, in 2013, Akyil et al. revealed that education based on Roy adaptation model had no impact on the physiological dimension,[22] which is not in congruence with our findings. This lack of consistency might be due to the lack of telephone follow-up in the mentioned study. In the current research, the patients were followed up by telephone calls, which might have improved their adaptation level.

The use of nursing theories can provide the nurses with tools to focus on their profession and deliver an all-around care with a social-psychological-biological approach for patients.[23] According to the Roy nursing model, the role of nurses is to improve adaptation in four adaptive modes and quality of life13. In the current study, the improvement of the physiological adaptation of the patients was investigated.

## 5. Conclusion

As the findings of the current study indicated, the care plan based on the Roy adaptation model led to the improvement of physiological adaptation level in the patients with thalassemia major. The application of the Roy nursing model is a nursing intervention for the enhancement of patient adaptation. Therefore, it is suggested that this model be used for patients with thalassemia. Moreover, further studies are recommended to investigate the practicality and effectiveness of this model in other chronic diseases.

## Conflicts of interest

The authors declare no conflicts of interest.

## Authors' contributions

Fariba Yaghoubinia: Monitoring the project, participation in data analysis, scientific editing, and confirmation of the final draft, Ali Navidian: Cooperation in the design of the draft, participation in the revision of the article, Nazanin Yousefian: Cooperation in the design of the draft, participation in the revision of the article,Fatemeh Chaji: Performing the project, data collection and design of the draft.

## Acknowledgments

This research was derived from a research project confirmed and funded by Zahedan University of Medical Sciences with the code of 7769. Hereby, we extend our gratitude to the Research Deputy of the university and manager of Ali Asghar Hospital of Zahedan for their cooperation.

## References

1. Lewandowski CM. Guidelines thalassaemia for the 2 revised edition of clinical management. eff br mindfulness interv acute pain exp an exam individ differ. 2015; 1. doi:10.1017/cbo9781107415324.004.

2. Rund D. Thalassemia 2016: modern medicine battles an ancient disease. American Journal of Hematology 2016; 91(1): 15-21.
3. Kontoghiorghe CN, Kontoghiorghes GJ. Efficacy and safety of iron-chelation therapy with deferoxamine, deferiprone, and deferasirox for the treatment of iron-loaded patients with non-transfusion-dependent thalassemia syndromes. Drug Design, Development and Therapy 2016; 10(1): 465.
4. Inamdar S, Gangrade A. Psychosocial problems of thalassemics in a tertiary care centre, indore. National Journal of Community Medicine 2016; 7(5): 391-4.
5. Allahyari A, Alhany F, Kazemnejad AN. The effect of family-centered empowerment model on the quality of life of school-age b-thalassemic children. Iranian Journal of Pediatrics 2006; 16(4): 455-61.
6. Arbabisarjou A, Karimzaei T, Jamalzaei A. The perception of Biological experience in patients with major thalassemia: a qualitative research. Global Journal of Health Science 2015; 7(1): 79.
7. Sultana R, Humayun S, Noor T, Humayun S, Zafar U. Impact of Thalassaemia on Quality of Life. Journal of the Society of Obstetrics and Gynaecologists of Pakistan 2017; 6(4): 156-60.
8. Nasiri M, Hosseini H, Shahmohammadi S. Mental health status in patients with thalassemia major in Iran. Journal of Pediatrics Review 2014; 2(1): 55-61.
9. Shaligram D, Girimaji SC, Chaturvedi SK. Psychological problems and quality of life in children with thalassemia. Indian Journal Pediatr 2007; 74(8): 727-730.
10. Afrasiabifar A, Karimi Z, Hassani P. Roy's adaptation model-based patient education for promoting the adaptation of hemodialysis patients. Iranian Red Crescent Medical Journal 2013; 15(7): 566.
11. Allen A, Fisher Ch, Premawardhena A, Peto T, Allen S, Arambepola M, et al.. Adaptation to anemia in hemoglobin E-ß thalassemia. Blood 2011; 118(26): 6994-5.
12. Sadeghnezhad Forotaghe M, Vanaki Z, Memarian R. The effect of nursing care plan based on "roy adaptation model" on psychological adaptation in patients with diabetes type II. Evidence Based Care 2011; 1(1): 5-20.
13. Naeim Hassani S, Tabiee S, Saadatjoo S, Kazemi T. The effect of an educational program based on roy adaptation model on the psychological adaptation of patients with heart failure. Modern Care Journal 2014; 10(4) :231-40. [Persian]
14. Fazel Asgharpoor A, Amini Z, Zeraati A, Esmaeli H. The effect of a care plan based on the roy adaptation model on level of fatigue in hemodialysis patients. Journal Evidence-Based Care 2012; 1(1): 77-90. [Persian]
15. Farsi Z, Azarmi S. Effect of roy's adaptation model-guided education on coping strategies of the veterans with lower extremities amputation: a double-blind randomized controlled clinical trial. International Journal of Community Based Nursing and Midwifery 2016; 4(2): 127.
16. Alimohammadi N, Maleki B, Shahriari M, Chitsaz A. Effect of a care plan based on Roy adaptation model biological dimension on stroke patients' physiologic adaptation level. Iranian Journal of Nursing and Midwifery Research 2015; 20(2): 275.
17. Frazão CM, Fernandes MI, Nunes MD, Sá JD, Lopes MV, Lira AL. Components of a roy's adaptation model in patients undergoing hemodialysis. Revista Gaucha de Enfermagem 2013; 34(4): 45-52.
18. Hassani P, Otaghi M. Roy adaptation model in hemodialysis patients: a mixed method research. Journal of Nursing and Midwifery Urmia 2012; 10(5): 610-20. [Persian]
19. Hamzepour H, Valiee S, Majedi MA, Roshani D, Seidi L. Effect of roy adaptation model in physiologic aspect an the level of consciousness of patients in intensive care unit: a clinical trial. Scientific Journal of Kurdistan University of medical sciences 2018; 22(91): 1-12. [Persian]
20. Hemmati Maslakpak M, Maleki F. The effect of performance care plan based on the roy adaptation model on fatigue in multiple sclerosis patients. Scientific Journal of Hamadan Nursing and Midwifery Faculty 2016; 24(3): 184-92.
21. Rosińczuk J, Kołtuniuk A, Górska M, Uchmanowicz I. The application of callista roy adaptation model in the care of patients with multiple sclerosis –case report. Online Brazilian Journal Nurs 2015; 4(3): 121-9.
22. Akyil RÇ, Ergüney S. Roy's adaptation model-guided education for adaptation to chronic obstructive pulmonary disease. Journal of Advanced Nursing 2013; 69(5): 1063-75.
23. Ursavaş FE, Karayurt Ö, İşeri Ö. Nursing approach based on Roy Adaptation Model in a patient undergoing breast conserving surgery for breast cancer. The Journal of Breast Health 2014; 10(3): 134.


**How to cit**e: Yaghoubinia F, Navidian A, Yousefian N, Chaji F. Effect of care plan based on Roy adaptation model on physiological adaptation in patients with thalassemia major. Medical- Surgical Nursing Journal 2017; 6(2-3): 37-43.