

## Effect of Exercise and Telenursing Intervention on Iron Deficiency Anemic Patients

1Samah M.Abd Elgaphar, 2\* Atef Abo Elsoud Ali, 3\*. Aml Ahmed Kanona4.Warda Mohamed Henedy

1. Assistant prof., Medical Surgical Nursing, Faculty of Nursing, Menoufia University, Egypt

2. Prof.and head of Tropical Medicine Department Faculty of Medicine, Menofia, University, Egypt

3. Assistant prof., Medical Surgical Nursing, Faculty of Nursing, Menoufia University, Egypt

4. Lecturer, Medical Surgical Nursing, Faculty of Nursing, Menoufia University, Egypt

**Abstract:** One of the leading risk factors for disability and death worldwide is iron deficiency, affecting an approximation of two billion people. Aim: To determine the effect of exercise and telenursing intervention on iron deficiency anemia (hemoglobin level, fatigue & total symptoms of anemia). Study design: A quasi experimental design was utilized. Setting: The study was conducted in Medical department at Menoufia University hospital. Sample: Purposive sample of 100 adult patients with iron deficiency anemia were divided randomly and alternatively into study and control group, 50 patients of each. Tools: 1-Structured Interview Questionnaire cover sociodemographic & Patient's clinical data, and symptoms of anemia II- Piper Fatigue Scale. Results: There were highly statistically significant differences on mean hemoglobin score, and fatigue and total symptoms of anemia scores between the study and control groups on the sixth and twelfth week post intervention than pre intervention with highly significant improvement in the study group than control one p value <0.01. Conclusion: exercise intervention associated with telenursing had positive effect in increase hemoglobin level and decrease in fatigue and total symptoms of anemia among iron deficiency anemic patients. Recommendations: It is recommended for patients with iron deficiency anemia to perform regular exercises program as a daily routine with emphasize on compliance to follow medical and nutritional therapy. Nursing through telephone is an effective method for conveying educational services for patients with anemia to their households that accordingly enhance the relationship between patient and nurse, save time and decrease the cost of management.

**Key wards:** Exercise, Telenursing, Iron deficiency anemia

Date of Submission: 06-12-2019

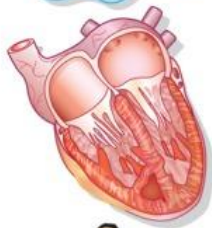
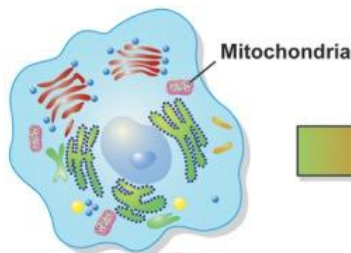
Date of Acceptance: 23-12-2019

### I. Introduction

The most common nutritional disorder worldwide is iron deficiency anemia (IDA) that accounts for nearly one-half of anemia cases<sup>(1 & 2)</sup>. At least 9-20% of adult women and above 2 percent of adult men in the United States and most of the 3.5 billion people in developing countries have iron deficiency anemia<sup>(3)</sup>. Iron deficiency anemia is decreased production of red blood cell due to little iron stores in the body. It can result from inadequate intake of iron, iron absorption decreased, iron demand increased, and iron loss increased<sup>(4)</sup>.

Adults with Iron deficiency is commonly related to poor dietary intake. Diet poor in iron rich sources is one strong risk factor of iron deficiency anemia in developing countries. Whereas, the most significant risk factor for iron deficiency anemia in both developed and developing countries is blood loss through menstruation<sup>(5)</sup>. There are many factors that contribute to poor iron status as, allergy free diets in which food fortification is absent (gluten-free grains are often not fortified with iron), vegan, vegetarian and raw foods diets, and poor dietary planning (diets with little variety and high in processed foods)<sup>(6)</sup>. IDA leads to many unintended consequences such as decrease energy, immune system problems, and neurological dysfunction (see fig.1). Identifying the underlying etiology and administering the appropriate therapy are keys to the evaluation and management of this condition.<sup>(7)</sup>

**Iron is critical for optimal functioning and survival of alive structures:**



**Fig. (1)**

**Iron deficiency results in:**

**Mitochondrial dysfunction**  
**Deranged activity of enzymes**  
**Abnormal transport and structural proteins**  
**Apoptosis**

**Tissue remodelling**  
**Impaired organ efficacy**

**impaired exercise capacity**  
**Reduced work efficacy**  
**Impaired cognitive performance and behaviour**  
**Increased morbidity and mortality**

Ankowska EA, von Haehling S, Anker SD, Macdougall IC, Ponikowski P. Eur Heart J. 2013 Mar;34(11):816-29.<sup>(8)</sup>

Fatigue and exercise intolerance are mutual complaints in anemic patients that due to decreased extraction of oxygen from peripheral skeletal musculature and the low ability of oxygen transportation. Fatigue is a subjective feeling and diffuse experience that includes physical, cognitive and psychological aspects of patients' life. Fatigue manifested in weakness, feeling of tiredness, and lack of energy<sup>(9)</sup>. It influenced not only on day life but also troubled self-care activities of daily living, emotional status, and consequently the quality of life. There is a positive relationship between patient's activity level and feeling of fatigue, due to activity diminished, and individual's strength reduced. Therefore, the various non-pharmacological management plans that concentrated on exercise and nutrition regulation must be effective to handle fatigue and other symptoms<sup>(10)</sup>.

Regular exercise is significant for total health and must be a part of daily routine for anemic patients. Anemic patient doesn't have adequate healthy red blood cells to carry oxygen to the rest of the body creating it challenging to perform exercises. However, that's not to say is impossible for anemic patients to exercise. Exercising with anemia is possible as long patients don't overexert themselves and follow precautions (ways) to safely exercise with anemia. These precautions are: 1. Start off slow. 2. Take breaks often. 3. Shorten their workouts. 4. Timing is key (Patients workout when they feel the most energized) 5. Talk to a doctor (Patients should talk to their primary care doctor to ensure their workout routine is safe and remember to always stick to the treatment plan already prescribed to them)<sup>(11)</sup>

Regular exercise can play a vital role in dealing with anemia and encourages a long and healthy life. Research suggests that regular exercise can markedly improve patient endurance and overall fitness level. It has been shown that aerobic and anaerobic exercise is significant for activities of daily living performed by anemic patients. Exercise performance can be enhanced through participation in structured exercise programs that, did not interfere with their hemodynamic, required less oxygen consumption, achieved easily and can improve their anaerobic and aerobic fitness<sup>(12)</sup>.

Aerobic exercise is a type of low to moderate intensity physical activity. Aerobic means in presence of oxygen. This oxygen is used to meet demands during exercise via aerobic metabolism. Generally, light to moderate intensity activities that are sufficiently supported by aerobic metabolism can be performed for extended periods of time<sup>(13)</sup>. Aerobic exercise can change the number of red blood cells and hemoglobin level

in several ways. The number of red blood cells may increase and may destruct in some cases through endurance training<sup>(14)</sup>. Exercise training can increase total hemoglobin and red cell mass, which result in enhancing oxygen carrying capacity.

Food for thought (Adjusting diet including good sources of iron and vitamin B12, such as spinach, eggs, oysters, beef, pork and lentils, ). Vitamin C (found in a variety of fruits) eaten with an iron-rich meal will help with the absorption of iron. Iron supplement is also effective<sup>(15)</sup>

Telenursing is the delivery, management, and coordination of care and services using telecommunications technology within the domain of nursing. Telenursing services aim to create a relationship with the caller, recognize the concern, evaluate the condition, solve problems in cooperation with the caller, and choose suitable solutions<sup>(16)</sup>. Telephone support is one method of tele monitoring to give instruction related to disease and to support health customers in self-management activities, such as medication adherence, physical exercise and diet which lead to reduce the adverse effect of the disease.

Using this technology leads to rapid access for the better services, cost reduction and easy access to the most appropriate specialized skills and an all-round increase in the quality of the provision of health services to patients. A prevalent utilization of home phone or mobile among individuals, telephone focused system particularly (telephone follow up call), would be a competent method for conveying educational services for patients to their homes that subsequently enhance nurse- patient relationship, save time and reduce the cost of management<sup>(17)</sup>. This nurse-led telephone intervention proved to be safe and efficient in many chronic diseases such as, diabetes, fatty liver disease, and hemodialysis patient<sup>(18, 19, and 20)</sup>. Hence this study aimed to evaluate the effect of exercise and telenursing intervention on iron deficiency anemia (hemoglobin level, fatigue & total symptoms of anemia)

### **1.1. Significance of the Study**

It has been detected from clinical experience in Medical department at menoufia university hospital that more women and few men admitted with iron deficiency anemia and suffered from many symptoms related to diagnosis as fatigue, dizziness, breath is characterized by shortness, weakness, chest pain, coldness in hands and feet coldness, headaches, palpitations, ringing in ears, restless legs syndrome. Telephone follow-up is considered a low cost and easily organized intervention, and a good way to manage symptoms and early recognition of complication, reassurance and quality aftercare; and also to exchange information and provide health education<sup>(21)</sup>. Researches done in this area are very limited. For this reasons, this study was conducted to evaluate the effectiveness of exercise training program and telenursing on iron deficiency anemia.

### **1.2. Aim of the current Study**

To determine the effect of exercise and telenursing intervention on iron deficiency anemic patients (hemoglobin level, fatigue & total symptoms of anemia)

### **1.3. Research Hypothesis**

1. Anemic patients who will practice exercise plus telephone follow up calls for 12 weeks will exhibit improvement in hemoglobin level, than those who will not practice exercise with telenursing.
2. Anemic patients who will practice exercise plus telephone follow up calls for 12 weeks will exhibit less fatigue level and less scores of total symptoms of anemia than those who will not practice exercise with telenursing.
3. There will be a negative correlation between hemoglobin level, fatigue & total scores of symptoms of anemia among study group.

## **II. Methods**

**2.1. Design:** A quasi experimental design was utilized to conduct the study. This design is the most frequently used quantitative research design.

**2.2. Setting:** Medical department at menoufia university hospital

**2.3. Subject:** This study was carried out on a purposive sample of 100 anemic patients of both sexes with Iron deficiency anemia who were selected and divided alternatively and randomly into two equal groups, 50 patients each:

**A. Group I (study group):** -practice exercises plus telenursing along with routine nursing and medical care.

**B. Group II (control group):** - received routine nursing and medical care only.

### **Inclusion criteria:**

- Conscious patients
- With confirmed diagnosis of iron deficiency anemia.
- Their age ranged from 18 to 40 years.

- Their body mass index ranged from 20 to 25 kg/m<sup>2</sup>.
- Each subject should have a mobile or home phone during the study

**Exclusion criteria:**

- Patients with diabetes, cardiopulmonary diseases, kidney disorder, metabolic disorder, menstrual disorders or anemia caused by other pathological origins other than iron deficiency were excluded from this study.
- Patients who had physical impairments were excluded from this study.

**Sampling technique:**

Sample size was statistically calculated by using the Steven, K, Thompson <sup>(22)</sup> equation at 95% confidence power of the study to be 107 patients that 7 patients didn't accept to participate in the study so the final number was 100 patients who are divided into 50 for each group

$$N = \frac{N * P(1 - P)}{[(N - 1) * (d^2 \div Z^2)] + [P * (1 - P)]}$$

**Where**

N = population size through past year (150 cases meet the criteria of selection)

n = sample size (107)

Z = confidence level at 95% (1.96)

p = Probability 50% (.5 used for sample size needed)

d = Error Proportion (0.05)

**2.4. Instruments**

Two instruments were used for data collection:

**2.4.1. structured interviewing questionnaire:** established after reviewing the related literature by the researchers. It was written in an Arabic to suit the level of patient's understanding. It consisted of three parts:

**A-Sociodemographic data.** As age, sex, level of education, occupation residence and socioeconomic status

**B- Patient's clinical data,** which includes: Hemoglobin (Hb), Weight and height were recorded and BMI was calculated according to the formula: BMI = Weight (Kg) / [Height (m)<sup>2</sup>].

**C-The total symptoms of anemia** (Fatigue, Dizziness, Shortness of breath, Weakness, Chest pain, Hands and feet Coldness, Headaches, Palpitations, ringing in ears, Restless legs syndrome) were evaluated through a self-administered questionnaire before starting the study and after 6 weeks of exercise intervention combined with telenursing and at the end of the study. It was given to each subject. A full instruction about the questionnaire was provided for each subject. Severity scoring for each symptom: 0 = No symptom. 1 = slightly symptoms. 2 = Moderate, consciousness of symptom but does not affect the daily routine of activities. 3 = A lot, continuously troubled by the symptom and powerless to carry out the daily routine of activities. 4 = Severe, symptom is overpowering and/or unable to carry out the daily routine of activities. It was adapted from Elnahas and Gabr, (2017) <sup>(23)</sup>

**2.4.1 II- Piper Fatigue Scale (PFS): -**

It was developed by Piper (1998) <sup>(24)</sup> and translated into Arabic by the researcher to assess fatigue level, it comprises twenty-two items categorized into four reliable and correlated dimensions: behavioral severity (six items); connecting to the severity and grade of disruption in activity of daily living; affective meaning (five items) connecting to the emotional meaning credited to fatigue; sensory (five items), connecting to the physical symptoms; and cognitive and mood (six items), connecting to mental and mood states. The score of the scale ranged from zero to ten, total and subscale mean scores are derivative from summing individual items and dividing by the number of items in the subscale/total scale to maintain the 0-10 scaling. With severity codes :- (0) none, (1-3) mild. (4-6) moderate and (7-10) severe. The higher scores correspond to higher fatigue level.

**2.4.1 Validity and Reliability**

The instruments were tested for its content validity by 3 experts in nursing field and 2 in medical field for clarity, relevancy, applicability, comprehensive. modifications were carried out accordingly. The reliability of first tool was evaluated by using a test – retest and Pearson correlation coefficient formula was used. It was found to be 0.86, with a period of 2 weeks' interval, the second tool of Piper Fatigue Scale has excellent reliability estimates ranging from 0.96 to 0.97. Internal consistency reliability was very good where Cronbach's  $\alpha$  ranged from 0.84 to 0.94 for the total scale in a study of 584 patients with cancer mean age 57 years old <sup>(25)</sup> In the present study, the test – retest reliability of the total Piper Fatigue Scale was 0.90 at 10 patients with a period of two weeks' interval.

**2.5 Formal consideration:** A permission to conduct the study was obtained from director and chief person in medical department after explaining the aim of the study.

**2.6 protection of human rights:** The researchers explained the purpose of the study and the rights of subjects, including anonymity, confidentiality, and withdrawing at any time. Informed consent was obtained from the patients who agreed to participate.

### **2.7. Pilot Study**

was piloted on 10 % of patients with iron deficiency anemia before starting the data collection and those subjects excluded. It revealed feasibility of instrument to carry out the study.

### **2.8. Field of Work**

**Conceptual framework:** The telenursing intervention is depending on Cox's Interaction Model of Client Health Behavior<sup>(26)</sup>. This model offers help in defining the optimum way for a nurse to interconnect with a patient to reach optimistic health outcomes. The TN intervention is planned to ensure continuity of care for patient and their families through a telephone call service providing nursing instruction to meet patient's needs for: A-health information; information is provided about the patient's health status and clarify treatments, medication, tests and the total condition; the simplicity of the information that is given is a significant aspect in gratification<sup>(27)</sup>. B-Affective support: is achieved by giving enough time for patients and their families to express their feelings and the nurse will listen considerately to their concerns which is a forecaster of satisfaction. C-Help in decision-making: The TN nurse will enable patients' participation in decision making by updating them of how their care is progressing and offering them with the diverse options that are likely to suit their wants and address their concerns<sup>(28&29)</sup>

Data Collection was extended from September 2018 to March 2019. The data were collected from both groups.

### **2.9 Intervention (Exercise intervention combined with 12 weeks' nurse –telephone follow up calls)**

The exercise program involved endurance warming up, stretching, and relaxation exercises. These exercises were self-administered from two to three times per week for thirty to thirty-five minutes and given as a home program intended to promote good health and lessen fatigue and symptoms of anemia. After reviewing related literature and consulting expertise in physiotherapy and medical science the program was designed, Safety of the exercise intervention for patient with anemia was approved by the mentioned specialists that includes: the program consisted of three stages

#### **First stage (warming up stage)**

- It was consisted of 5 minutes warming up in the form of walking in place and going up and down for joint warming. Alternative flexion and extension of knee and hip joint for five –ten times in a rhythmic and specific pace

#### **Second stage (active stage)**

- To toughen the upper, lower extremities, and trunk muscles, dynamic or static stretching exercises were practiced for ten minutes at the prolonged position of the muscles, with rests for ten–fifteen seconds.
- Resistance exercise was independently tolerated and practical for quadriceps and hamstrings for ten minutes in the form of weight resistance (sand bags from 5 to 8 kg). Initially, a small weight was utilized and patient performed sets of repetitions starting at three sets of ten repetitions and progressed to three sets of fifteen repetitions with 60 second rest period in between until no longer challenging for weight lifted.

#### **Third stage (cooling down stage)**

- Cool down using, breathing control, relaxation methods and relaxation positions for the patient. These approaches were used for teaching the patient difference between relaxation and contraction, which provided from 5–10 minutes a state of relaxation. exercise intervention was gradually increased from the second week forward, the number of recurrences depended on the pressure of the activities during the exercise intervention.

- Adequate explanation given for each patient individually and demographic and clinical data was collected, baseline data about their fatigue level and total symptoms of anemia were assessed (pretest).

- The content of the exercise training was given on 2 interactive sessions. Each session was conducted for 1 hour from 10 a.m. to 11 p.m. Presentation by using power point and more clarification by video were used followed by group discussion. The type of each exercise and rest between them had been written in poster, it was performed from two to three times per week for twelve weeks at home, and every session of exercise training has taken about 30–40 minutes. Patients were instructed to stop exercise immediately if they felt pain, shortness of breath or fainting.

- Also they were instructed about healthy eating habits foods that contain iron, types of iron and factors that increase iron absorption.

- With help of master nurse working in hospital the studied patients followed up by the researcher for twenty calls. In first and second months, two telephone call follows up per week and for the following third month one telephone call per one week. Fundamentally, patients were followed up for 12 weeks. Patients were asked about the regularity in performing trained exercise and following healthy diet in order to detecting health problems every nurse telephone call. As soon as a health problem was discovered, patients and their caregiver were counseled concerning it and recorded to be followed in the following telephone call. All phone calls were recorded on phone call Form. Problems determined throughout phone calls, suggested solution, next interview dates, issues and evaluations that would be described at the following interview were recorded to the same form.
- The studied patients were reassessed after six & 12 weeks post intervention (post-test) for their hemoglobin level, fatigue level and total symptoms of anemia using the same format

**2.10. Statistical Analysis**

Upon completion of data collection, data entry and statistically analyzed using (SPSS), version 19. Qualitative variables were offered as frequency and percentage and compared using a Chi-square test ( $\chi^2$ ) while quantitative variables were presented as in the form of mean (x) and standard deviation (SD), and tested by Independent t test. Correlation between variables was evaluated using Pearson's correlation coefficient (r). Level of statistical significant was considered at  $P \leq 0.05$ .

**III. Results**

**Table 1:** Pointed that there were no statistical significant differences between study and control groups regarding socio demographic and clinical data

**Table 2:** showed that there were no statistically significant differences between the mean scores on the degree of fatigue for study and control groups pre intervention. While mean scores and standard deviation of total fatigue score for the study and control groups after 6 and 12 weeks of exercise performance with telenursing follow up calls were ( $5.01 \pm .91$  and  $5.96 \pm 1.21$ ,  $4.1 \pm .68$  and  $5.46 \pm 1.01$  respectively). There were highly statistically significant differences between the mean scores of fatigues for both groups with p value < .01

**Table 3:** revealed that there was no significant statistically differences between the mean of total symptoms scores of iron deficiency anemia for study and control groups pre intervention. While mean scores and standard deviation of total symptoms of anemia for the study and control groups after 6 and 12 weeks of exercise performance with telenursing follow up calls were ( $19.01 \pm .91$  and  $23.6 \pm 1.12$ ,  $10.18 \pm 1.50$  and  $19.46 \pm 1.01$  respectively). There was a highly statistically significant difference between the mean total symptoms scores of anemia for both groups with p value < .01

**Table (4)** revealed that there was a negative correlation between mean score of hemoglobin level and mean scores of fatigue and total symptoms of anemia after 6 and 12 weeks of exercise intervention combined with telenursing

**Figure (2)** Showed that there was a significant improvement in mean score of hemoglobin levels among study group than control after 6 weeks and 12 weeks of exercise intervention combined with telenursing

**Table 1: Percentage distributions of patients of the both groups according to their socio-demographic and clinical data.**

Variables	Study group No=50		Control group No=50		X <sup>2</sup>	p-value
	No	%	No	%		
<b>Age in years</b>	Mean $\pm$ SD 30.56 $\pm$ 5.6		Mean $\pm$ SD 29.60 $\pm$ 4.97		t-test 0.901	0.371
<b>Body mass index</b>	23.24 $\pm$ 1.74		23.27 $\pm$ 1.59		.120	.905
<b>Sex</b>						
Male	5	10	3	6	0.543	0.69
Female	45	90	47	94		
<b>Education</b>					0.405	0.939
Illiterate	12	24	14	28		
Preparatory	13	26	11	22		
Secondary	15	30	16	32		
High education	10	20	9	18		
<b>Marital status</b>					1.04	.593
Single	4	8	4	8		
Married	45	90	43	86		
Divorced	1	2	3	6		
<b>Occupation</b>					0.271	0.603
Worker	10	20	8	16		
Housewife	40	80	42	42		
<b>Residence</b>						

Rural	38	76	35	70	0.457	0.499
Urban	12	24	15	30		
<b>Socioeconomic level</b>						
High	8	16	9	18		
Medium	12	24	13	26	0.102	0.95
Low	30	60	29	58		

**Table (2) Comparison of piper fatigue dimensions pre, post 6 weeks and 12 weeks of exercise performance with telenursing follow up calls among iron deficiency anemic patients**

Piper Fatigue Scale	Study N=50	Control N=50	T - test	P value
	Mean ± SD	Mean ± SD		
• Pre intervention	6.40 ± 1.08	6.56 ± 1.19	.699	.486
• 6 weeks post intervention	5.01 ± .91	5.96 ± 1.21	2.88	.017
• 12 weeks post intervention	4.1 ± .68	5.46 ± 1.01	5.2	.01

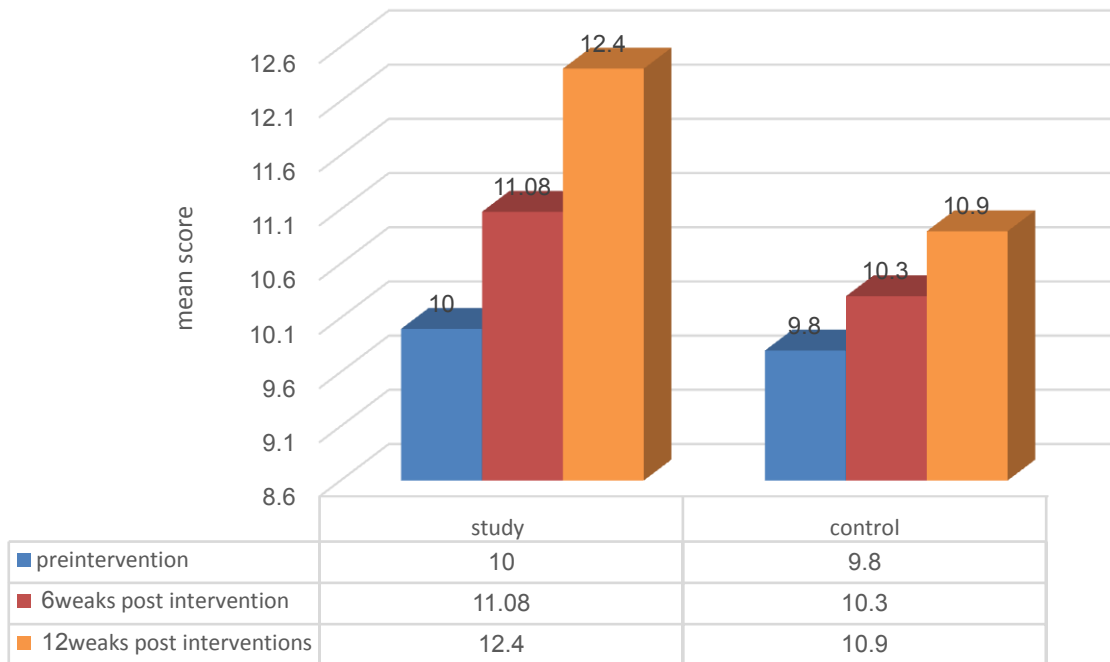
**Table (3) Scores of total symptoms of anemia among iron deficiency anemic patients pre, post 6 weeks and 12 weeks of exercise performance with telenursing follow up calls**

Total symptoms scores of anemia	Study N=50	Control N=50	T - test	P value
	Mean ± SD	Mean ± SD		
• Pre intervention	25.88 ± 1.3	26.56 ± 1.17	.806	.574
• 6 weeks post intervention	19.01 ± .91	23.6 ± 1.12	6.88	.01
• 12 weeks post intervention	10.18 ± 1.50	19.46 ± 1.01	10.2	.001

**Table (4) correlation between total score of hemoglobin and fatigue and total symptoms of anemia after 6 and 12 weeks of exercise intervention and telenursing among study group**

-	Hemoglobin	6 weeks of exercise intervention and telenursing		12 weeks of exercise intervention and telenursing	
		R	P	R	P
-	Fatigue	-.704	0.001	-.585	0.001
-	Total symptoms of anemia	-.547	0.001	-.616	0.001

figure (1) : Mean score of hemoglobin levels among study and control subjects pre intervention 6 weeks post intervention and 12 weeks post intervention



#### IV. Discussion

Practicing exercise combined with follow up nursing telephone calls constitute a potentially favorable intervention to moderate treatment side effects and have a valuable outcome on patient's physical and emotional functions<sup>(30)</sup>. For this reason, the present study was designed to determine the effect of exercise intervention and telenursing on iron deficiency anemia (hemoglobin level, fatigue level and total symptoms of anemia). The outcomes of the present study revealed that adding exercise combined with telephone follow up calls for three months would improve hemoglobin level, scores of total symptoms of anemia, and fatigue levels among patients with anemia.

##### Regarding hemoglobin level

The outcomes of the present study showed that hemoglobin level improved among study group than control group after sixth and twelfth week of exercise training and twelve weeks of follow up through telenursing. These findings are in agreement with Drouin, et al. who reported that HCT, Hb, RBC and VO<sub>2</sub> peak increased by seven weeks of aerobic exercise training with moderate intensity (walking for 20–45 min, 3–5 times per week, at 50–70% of measured maximum heart rate)<sup>(31)</sup>. In the same line the findings of the present study came in accordance with that of Kratz, et al. who mentioned that post accomplishment of the 26.2 mile course by 32 runners their number of red blood cells, hemoglobin and the percentage of hematocrit increase<sup>(32)</sup>. Also findings of this study consistent with that of Wasserman, et al. who informed that after exercise Hb increase, chiefly related to hem concentration as fluid shifts intracellular and is also lost during respiration and sweating<sup>(33)</sup>. In addition, Dimeo, et al. stated that among the training subject's hemoglobin increased significantly, while unchanged among non-training subjects 'after six weeks of treadmill walking'<sup>(34)</sup>. Likewise, findings are similar to what was reported by Dimeo, et al. who reported that walking on a treadmill' at an intensity of 80% of the maximal heart rate process of hematopoiesis enhanced as the effect of increased production of growth hormone in anemic patients<sup>(35)</sup>. Also Mohamady, et al. concluded that mean values of



Hb and RBCs in the study group significantly increased than control group among chemotherapy-induced anemia in elderly women with breast cancer through Moderate intensity aerobic exercise<sup>(36)</sup>. In contrast Fetscher, et al. studied the effect of aerobic exercise in cancer patients during high-dose chemotherapy. Exercise intensity was (50% of the maximum heart rate) and exercise duration was (13–15 days). There are no significant differences in red blood cells levels between trained and untrained subjects<sup>(37)</sup>. This may also be due to exercise intensity or duration inefficient to reason changes in red blood cells measures. The results of this study disagreed with Ramizanpour and Kazemi, who found that iron supplementation with aerobic exercise (three sessions per week for six weeks), increased the amount of iron, serum ferritin and transferrin while no significant effects were found on hemoglobin, hematocrit and red blood cells<sup>(38)</sup>. The outcomes of this study disagreed with Mousavizadeh., et al. who found that following eight weeks of aerobic training (40 min running) at heart rate of 60 to 65% with 16 girls aged from 18 to 22 years, there was a significant decrease in Hb, RBCs and Hct<sup>(39)</sup>. The difference of the results may be due to the variables such as training period length and economic nutrition. Schmidt and Prommer, reported that adjustments of Hb by exercise are slow, and that a marked increase may need numerous years of exercise. It could be said that beside the different factors like intensity and duration of exercises, and water which decrease or increase of hemoglobin, red blood cells and white blood cells, other parameters like energy systems connected to physical activities play an important role<sup>(40)</sup>.

In another study, the researchers assessed the effect of telenursing on lipid control and glycemic on sixty patients with type 2 diabetes mellitus. The results showed that glycosylated hemoglobin, cholesterol, triglyceride and LDL levels were decreased in the intervention group than the control group after twelve weeks of telenursing<sup>(41)</sup>. The reason for unchanged level of Hb in the control group was noncompliance with the treatment regimen, while in the intervention group subjects who had undergone the intervention, the level of Hb was increased; this reflects the impact of the telenursing on the increase of Hb level in these patients. counseling services by phone after receiving clinical advice from a physician as well as continuous trainings that could have a positive effect and help the patient to have healthy behaviors and also help to improve the results of treatment can have provided through telenursing.

#### **Concerning fatigue and total symptoms of anemia**

The present study hypothesized that patients who received exercise intervention combined with telephone follow up calls for 12 weeks will exhibit less fatigue and total symptoms of anemia scores than those who will not receive. Findings of the present study found that there was a statistically significant reduction in the mean scores of fatigue and total symptoms of anemia among the study group post intervention compared with the control group. The results of the current study came in accordance with Elnahas & Gabr who concluded that aerobic exercise in addition to medical therapy had a positive effect in increasing hemoglobin level and enhancing total symptoms of anemia among study group than control group depend on medication only<sup>(23)</sup>. This is congruent with Weert., et al who reported that physical training joined with cognitive-behavioral therapy and physical training only had significant and more positive effects on fatigue compared with no intervention<sup>(42)</sup>. These outcomes are also consistent with that of Garssen., et al who concluded that 12-weeks of bicycle exercise training in 20 patients with severe fatigue resulted in decreasing fatigue scores by 20% ( $p < 0.001$ ). Also, physical fitness, functional result, and quality of life were improving<sup>(45)</sup>. The outcomes of this study supported by Mostert and Kesselring., who found that, there was a tendency to less fatigue after four weeks of aerobic exercise training<sup>(44)</sup>. These findings are similar to what was reported by Jose., et al who studied the effect of supervised multimodal exercise interventions on cancer-related fatigue. Intervention included aerobic, resistance, and stretching exercise, while the control group received conventional care, where patients did not participate in any exercise intervention program. The results showed that there were significant differences between the study and control groups. The study group had less fatigue level than the control group post intervention<sup>(45)</sup>. Similarly, in a study done by Chang., et al who quoted that, a recent randomized trial has shown that in Taiwan HD patients, intradialytic leg ergometry was effective in reducing fatigue and improving physical fitness in already active hemodialysis patients and to reduce fatigue in sedentary patients<sup>(46)</sup>. This explains the results of the present study that shows there is significant improvement for study group regarding their fatigue and symptoms of anemia after application of exercises intervention associated with follow up through telenursing. It seems that this happens because of the increased roles of the patient in taking care of themselves; the patients have discovered a new kind of relation and training and their motivation for taking care of themselves and contacting with health providers has increased. In a telephone-based system, patients are being contacted by health care providers on regular bases and they would be provided with some information about their illness and their treatment method.

In recent years, several studies on chronic diseases have been undertaken by offering care through telephone and similar results were achieved with regards to the effectiveness of telenursing on the adherence to treatment regimen which in turn improve symptoms of disease.<sup>(47)</sup> Due to the chronic nature of such diseases, the patients' compliance to the treatment and learning to adapt and change the lifestyle need time and continuous

monitoring by a treatment team. Thus, in addition to training, follow-ups with the aim to create and develop a nonstop caring relationship is essential to increase the awareness and strengthen the process of care which improves the quality of life and health care services, reduces the symptoms, and increases the client's satisfaction.

The outcomes of the present study revealed that there is a negative correlation between total mean score of hemoglobin for patients with his / her fatigue and total symptoms scores of anemia among study group after 6 and twelve weeks post exercises and telenursing. This finding supported by Ören, and Zengin, who mentioned that in cases whose HGB was  $\geq 12$  all their physical, social, emotional, fatigue, pain, general health, and health from previous year dimensions of quality of life except for the mental health were better<sup>(48)</sup>. From the researcher point of view, this may be a result of Exercise intervention associated with telenursing and teaching about importance of exercise and following good diet and good compliance to follow prescribed therapy that helps to maintain and strengthens muscles, circulatory system and improves hemoglobin level that associated with increased oxygen carrying capacity of red blood cells, which leads to sufficiency in meeting the physical needs of tissues so scores of fatigue and total symptoms of anemia decreased.

#### **Limitations:**

There are some limitations in the current study, the main limitation was the small sample, and another limitation to our study was that the period of the management

### **V. Conclusion**

Exercise intervention associated with telenursing had positive effect in increase hemoglobin level and decrease in fatigue and total symptoms of anemia among iron deficiency anemic patients.

### **VI. Recommendation**

It is recommended for patients with iron deficiency anemia to perform regular exercises program as a daily routine with emphasize on compliance to follow medical and nutritional therapy. Nursing through telephone is an effective method for conveying educational services for patients with anemia to their households that accordingly enhance the relationship between patient and nurse, save time and decrease the cost of management. Therefore telenursing could be programmed as a part of health plan for patients with anemia

### **Acknowledgment**

My thanks are submitted first and foremost to Allah who gave me the strength and ability to complete this work. I am quite grateful to any one helped me to accomplish this work including the research participants, nurses and doctors in Menoufia university, Egypt.

### **References**

- [1]. World Health Organization. Iron Deficiency Anaemia: Assessment, Prevention, and Control: A Guide for Programme Managers. Geneva, Switzerland: World Health Organization; 20016
- [2]. Johnson-Wimbley TD, Graham DY. Diagnosis and management of iron deficiency anemia in the 21<sup>st</sup> century. *Therapy Adv Gastroenterol.* 2011;4(3):177-184.
- [3]. Ruel M. (2001). Can food-based strategies help reduce vitamin A and iron deficiencies? Washington, D.C: International Food Policy Research Institute (IFPRI);
- [4]. WHO Global Database on Anaemia. Worldwide Prevalence of Anaemia 1993-2005. Geneva, Switzerland: World Health Organization; 2008.
- [5]. Moschonis G, Papandreou D, Mavrogianni C, Giannopoulou A, Damianidi L, Malindretos P, Lionis C, Chrousos G, Manios Y. Association of iron depletion with menstruation and dietary intake indices in pubertal girls: The healthy growth study. *BioMed Research International.* 2013;1-8
- [6]. Killip, S., Bennett, J.M. & Chamber, M.D. (2007). Iron Deficiency Anemia. *Am Fam Physician,* 75 (5), 671-678.
- [7]. Noorazar SGh, et al. (2015). Relationship between severity of depression symptoms and iron deficiency anemia in women with major depressive disorder *J Anal Res Clin Med,* 3(4): 219-24
- [8]. Ankowska EA, von Haehling S, Anker SD, Macdougall IC, Ponikowski P. *Eur Heart J.* 2013 Mar;34(11):816-29. doi: 10.1093/eurheartj/ehs224. Epub 2012 Oct 25
- [9]. Nunes MDR, Silva MCM, Rocha EL, Lima RAG, Nascimento LC. Measurement of fatigue in children and adolescents with cancer. *Text Context Nursing, Florianopolis,* 2014; 23(2): 492-
- [10]. Mohamed A. S. The Effectiveness of an Educational Intervention on Fatigue in Hemodialysis Patients: A Randomized Controlled Trial. *IOSR Journal of Nursing and Health Science.* 2014; 3, (4).
- [11]. American College of Sports Medicine, (2010) Exercising with Anemia: Prescription for Health .Available at <https://www.medscape.com/view/article>
- [12]. Marinov BI, Terziyski KV, Sapunarova KG, et al. Exercise performance in children with severe beta-thalassemia before and after transfusion. *Folia Med (Plovdiv)* 2008; 50: 48-54.
- [13]. Plowman S, Smith D.'Exercise physiology for health fitness and performance, Lippincott Williams & Wilkins, Philadelphia. 2007;61.
- [14]. Plowman S, Smith D. Exercise physiology for health fitness and performance, 3rd ed., Lippincott Williams & Wilkins, Philadelphia, 2011;401-407.
- [15]. Joshua R (2018). Integrative Nutrition: A Whole-Life Approach to Health and Happiness.

- [16]. Wagner D, Bear M: Patient satisfaction with nursing care: a concept analysis within a nursing framework. *J Adv Nurs*. 2009; 65(3): 692–701
- [17]. Ghazanfari Z, Arab M, Forouzi M and Pouraboli B. Knowledge level and educational needs of thalassemic children's parents in Kerman. *Iranian Journal of Critical Care Nursing*.2010;3(3):99-103.
- [18]. Higano K, Shibayama T, Ichikawa M, Motomura M, i Shimano H, Kawakami Y, Furuya K and Kawaguchi T. The Effects of Telenursing with Goal Attainment Scaling in Diabetic Patients: A Case Report. *Int J Nurs Clin Pract* 2015, 2: 117
- [19]. Fard SJ, MS; Ghodsbin F.; Kaviani MJ .; Jahanbin I; Bagheri Z. .The Effect of Follow up (Telenursing) on Liver Enzymes in Patients with Nonalcoholic Fatty Liver Disease: A Randomized Controlled Clinical Trial. *IJCBNM* July 2016; Vol 4, No 3
- [20]. Jahromi, M K , Javadpour,S; ,Taheri, L and Poorgholami F. Effect of Nurse-Led Telephone Follow ups (Tele-Nursing) on Depression, Anxiety and Stress in Hemodialysis Patients. *Glob J Health Sci*. 2016 Mar; 8(3): 168–173.
- [21]. McCorkle R, Siefert M. L, Dowd M. F, Rohinson J. P, Pickett M. Effects of Advanced Practice Nursing on Patient and Spouse Depressive Symptoms, Sexual Function, and Marital Interaction after Radical Prostatectomy. *Urol Nurs*. 2007;27(1):65–77.
- [22]. Steven, Thompson, (2012). Sampling. Third. Edition, p: 59-60
- [23]. Elnahas, EM, and Gabr, AA. Impact of Aerobic Exercises on Iron Deficiency Anemia in Girls. *Int J Physiother Res* 2017;5(5):2399-04.
- [24]. Piper B, Dibble S, Dodd M, Weiss M, Slaughter R and Paul S. (1998). The revised Piper Fatigue Scale: psychometric evaluation in women with breast cancer. *Oncol Nurs Forum.*; 25(4):677–684.
- [25]. Dalete D., Cibebe A and Barbara F. (2009). Fatigue in Brazilian cancer patients, caregivers, and nursing students: A psychometric validation study of the Piper Fatigue Scale Revised supportive care; 17, (6), pp. 645-52
- [26]. Cox CL: A model of health behavior to guide studies of childhood cancer survivors. *Oncol Nurs Forum* 2003, 30(5): 92–99.
- [27]. Moscato SR, Valanis B, Gullion CM, Tanner C, Shapiro SE,Izumi S: Predictors of patient satisfaction with telephone nursing services. *Clin Nurs Res* 2007, 16(2): 119–137
- [28]. Wahlberg AC, Cedersund E, Wredling R: Telephone nurses' experience of problems with telephone advice in Sweden. *J Clin Nurs* 2002, 12(1): 37–45.
- [29]. Beaulieu R, Humphreys J: Evaluation of a telephone advice nurse in a nursing faculty managed pediatric community clinic.*J Pediatr Health Care*.2008; 22(3): 175–181.
- [30]. Ali-Akbari, F., Khalifehzadeh, A.,& Parvin, N(2011). The effect of short time telephone follow-up on physical conditions and quality of life in patients after pacemaker implantation. *Journal Sharekord University of Medical Sciences*; 11(3): 23-8. (Persian).
- [31]. Drouin J, Young T, Beeler J, Byrne K, Birk T, Hryniuk W, Hryniuk L. Random control clinical trial on the effects of aerobic exercise training on erythrocyte levels during radiation treatment for breast cancer.*Cancer*. 2006; 107:2490–2495
- [32]. Kratz A, Wood M, Siegel A. Effects of marathon running on platelet activation markers: Direct evidence for in vivo platelet activation. *Am J Clin Pathol*. 2006; 125:1- 5.
- [33]. Wasserman K, Hansen J, Sue D, Stringer W, Whipp B. Principles of Exercise Testing and Interpretation.4th ed., Philadelphia, 2004;368–376.
- [34]. Dimeo F, Tilmann M, Bertz H, Kanz L, Mertelsmann R, Keul J. Aerobic exercise in the rehabilitation of cancer patients after high dose chemotherapy and autologous peripheral stem cell transplantation. *Cancer* 1997; 79:1717–22.
- [35]. Dimeo F, Knauf W, Geilhaupt D, Doning D. Endurance exercise and the production of growth hormone and hematopoietic factors in patients with anemia. *Br J Sports Med* 2004; 38: 6-37
- [36]. Mohamady, H.M., Elsisi, H.F., Aneis, Y.M., Impact of moderate intensity aerobic exercise on chemotherapy-induced anemia in elderly women with breast cancer: A randomized controlled clinical trial *Journal of Advanced Research* (2016), doi:
- [37]. Fetscher S, Dimeo F, Lange W, Mertelsmann R, Keul J. Effects of aerobic exercise on the physical performance and incidence of treatment -related complications after high-dose chemotherapy. *Blood* 1997; 90:3390–94
- [38]. Ramizanpour M, Kazemi M. Effects of aerobic training along with iron supplementation on the hemoglobin, red blood cells, hematocrit, serum ferritin, transferrin and iron in young girls [persian].*Koomesh*. 2012;13(2):233-239
- [39]. Mousavizadeh M, Ebrahim K, Nikbakht H. Effect of one period of selective aerobic training on hematological indexes of girls. *Sci J Iran Blood Transfus Org*. 2009;6(3):227-231.
- [40]. Schmidt W, Prommer N. Effects of various training modalities on blood volume. *Scand J Med Sci Sports*.2008;18(1):57-69
- [41]. 41-Nesari M, Zakeri Moghadam M, Rajab A, et al. Effect of telephone follow-up by nurses on blood glucose and lipid control in patients with type 2 diabetes. *Journal of Diabetes and Metabolic Disorders*.2008;8:115-22.
- [42]. Weert E, May A, Irene I, Post W, Schans C, Borne B, Mesters I, Ros W, Josette E. Cancer-related fatigue and rehabilitation: A randomized controlled multicenter trial comparing physical training combined with cognitive-behavioral therapy with physical training only and with no intervention. *Physical Therapy*. 2010;90(10):1413-1425.
- [43]. Garssen M, Bussmann J, Schmitz P, Bergen A, WelterT, Merckies I, Stam H, Doorn P. Physical training and fatigue, fitness, and quality of life in Guillain–Barré syndrome and CIDP. *Neurology*. 2004;63(12):2393-2395
- [44]. Mostert S, Kesselring J. Effects of a short-term exercise training program on aerobic fitness, fatigue, health perception and activity level of subjects with multiple sclerosis. *Mult Scler*. 2002;8(2):161-168.
- [45]. Jose, F., Emilio G., and Robinson R. (2014). Effects of Supervised Multimodal Exercise Interventions on Cancer-Related Fatigue: Systematic Review and Meta-Analysis of Randomized Controlled Trials. 51-23.
- [46]. Chang Y., Cheng SY., Lin M., Gau FY., Chao YF. (2010). The effectiveness of intradialytic leg ergometry exercise for improving sedentary life style and fatigue among patients with chronic kidney disease: A randomized clinical trial. *Int J Nurs Stud*; 47(11): 1383-8.
- [47]. Kim HS, Oh JA. Adherence to diabetes control recommendations: impact of nurse telephone calls. *J Adv Nurse*. 2003; 44:256-61.
- [48]. Ören, B. and Zengin, N. (2016) .The Effect of Anemia on Quality of Life and Self-Care Agency in Turkey Hemodialysis Patients. *Open Journal of Nursing*, 6, 443-448

Samah M.Abd Elgaphar. " Effect of Exercise and Telenursing Intervention on Iron Deficiency Anemic Patients. " *.IOSR Journal of Nursing and Health Science (IOSR-JNHS)*, vol. 8, no.06 , 2019, pp. 33-43.