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Health Related Quality of Life Following Dietary and Exercise Interventions among Women with Knee Osteoarthritis

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Abstract **Background**: Osteoarthritis (OA) is accepted as a major public health problem. It is one of the main causes of impaired function that reduces quality of life (QOL) worldwide. A well-balanced diet of plant-based origin including varied diet that is high in vegetables and fruits and low in refined carbohydrates and fats, such as saturated fats and trans-fats. This is obtained by understanding how diet and exercise affecting perception of quality of life. **The aim of this study** was to assess health related quality of life after following dietary and exercise interventions among women with knee osteoarthritis. **Design**; a quasi-experimental design with pre-post-test was used. **Settings**; this study was conducted in orthopedic and physical therapy outpatient clinics of Tala Central Hospital, Menoufia Governorate, Egypt. **Sample**: A purposive sample of 120 women diagnosed with knee osteoarthritis divided equally into diet only and diet and exercise groups. **Tools**: I- An interviewing questionnaire to assess socio demographic data and exercise practice. II- Eating pattern questionnaire. III- knee related quality of life questionnaire to assess quality of life & IV- Medical outcomes study questionnaire to assess physical and social functioning. **Results**; indicates more improvement of diet and exercise group regarding the determined aspects of quality of life domains revealing significant difference regarding troublesome due to lack of confidence in knee joint as, 13.3 % & 6.7 % of diet only and diet and exercise group respectively reported mild trouble before the intervention, increased significantly to 26.7 % & 53.3 % after the intervention respectively. **Conclusion**; this study revealed that a significant more improvement in some aspects affecting quality of life for the diet and exercise group than diet only. **Recommendations**; Lifelong physical activity and dietary modifications are strongly recommended for the improving knee osteoarthritis including walking, water strengthening and stretching exercises in a moderate manner. Education as one of the main nursing role for the necessity of moderate exercise with well-balanced diets based on plant sources, can improve quality of life. Consuming well-balanced diet stressing fresh fruits and vegetables, sea food, low salt diet and healthy spices including ginger and turmeric is recommended.

Keywords: *diet, exercise, quality of life, knee osteoarthritis*

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1. Introduction

Osteoarthritis (OA) is the most common type of arthritis found worldwide especially in the elderly female. It is a major cause of disability in older adults [1]. The prevalence of osteoarthritis among women increases dramatically after the age of 40 years. Women have twice the risk than men of developing bilateral knee osteoarthritis. A withdrawal from estrogen at menopause may be a trigger [2,3].

Globally approximately 250 million people have osteoarthritis of the knee (3.6% of the population). OA affects nearly 27 million people in the United States, accounting for 25 % of visits to primary care physicians, and half of all NSAID prescriptions [4]. In the Middle East, More than one million people suffer from OA in Iraq, Yemen, Saudi Arabia, and Syria [5].

In Egypt, more than five million people have OA [6]: percentage of years of healthy life lost due to OA disability per 100.000 people is 67.6 %. The rate of years of healthy life lost from osteoarthritis has changed over time and relative to the parent region of North Africa & Middle East and the world at large. It was increasing till reaching 176.695, 178.803, and 157.403 in 2013 for the world, Egypt and North Africa & Middle East region respectively per 100,000 people for both men and women. This is reveal obvious increase than global and regional rates. The annual years of healthy life lost per 100,000 people from osteoarthritis has increased by 19.1% since 1990 till 2013, an average of 0.8% a year [7].

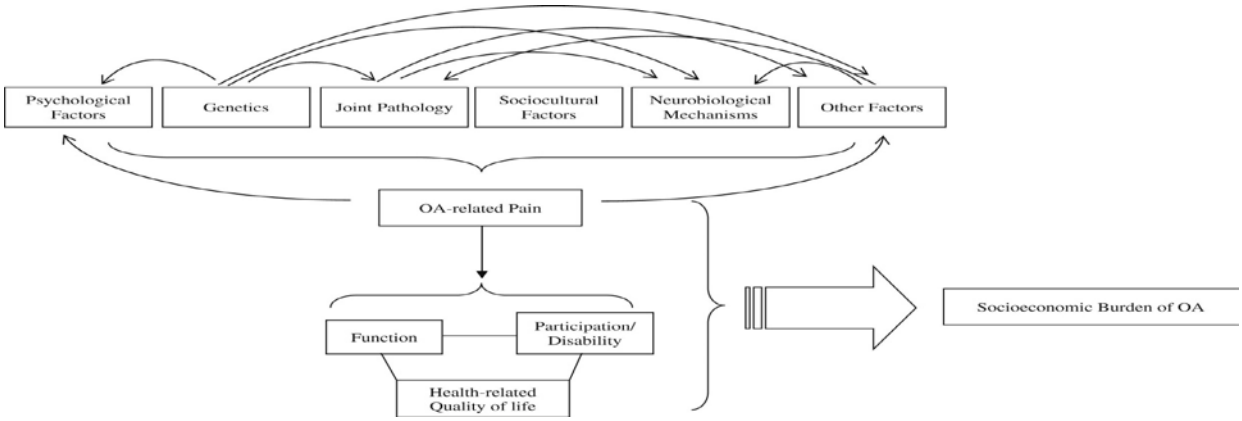

Figure 1. Schematic illustrating the multifactorial nature of pain in OA, with complex inter-relationships between risk factors, and the potential wide-ranging effects of OA pain on Health-related Quality of Life [8]

Risk factors for pain in OA; was viewed as complex, multidimensional nature of the pain experience in OA, it is perhaps not surprising that the underlying etiology of pain is multifactorial, most often considered in a bio-psychosocial framework (Figure 1).

Osteoarthritis is the most common form of arthritis. It causes pain, swelling, and reduced movement in the joints. According to [9] who pointed out the Key points in Osteoarthritis that was summarized as:-

- Osteoarthritis is a condition affecting joints. Changes affect all parts of the joint including cartilage (the slippery tissue that covers the ends of bones), joint linings and ligaments and muscles.
- Osteoarthritis can occur in any joint, but the most common joints to be affected are hands, fingers, knees, hips, spine (neck and lower back).
- Osteoarthritis is more common in people who are older but can also affect younger people, it has been found in some people under the age of 21.
- You are more at risk for osteoarthritis if you are overweight or have had a joint injury.
- Exercise and weight loss (if required) in conjunction with other treatments can help to improve mobility and daily functioning, reduce pain and flares, and prevent your osteoarthritis from worsening.
- Not everyone who has early osteoarthritis will develop severe osteoarthritis.

The development of OA is correlated with obesity, especially with respect to knees [10]. When OA is accompanied with obesity, adipose tissue is producing inflammatory mediators e.g adipokines, which increase the levels of inflammatory activity throughout the body, and even in osteoarthritic joints [11].

In the past 25 years dietary changes occurred due to the following factors. Increasing consumption of refined & high glycemic-load carbohydrates results in elevated insulin secretion to decrease the resulting post-prandial rise in blood glucose. Increasing consumption of refined vegetable oils rich in omega-6 fatty acids & decreasing consumption of omega-3 fatty acids. This results in prevalence of obesity and silent inflammation [12]. Research now clearly demonstrates that dietary habits can promote a state of chronic inflammation that leads to the expression of pain, disability, and most of chronic diseases. It should consist of the appropriate balance of essential fatty acid & consistent insulin control [13]. The dietary intervention is based on consuming *omega-3 fatty acids* and reducing omega-6 fatty acid. The fat is used to manufacture AI prostaglandins, and decreasing the production of inflammatory ones caused by omega-6 [14].

Assessment of health-related quality of life (HRQOL) among patients with osteoarthritis (OA) helps the health care provider to understand the impact of the disease on the patients from their own perception and make health services more patient-centered. HRQOL is increasingly considered a valid health indicator in many diseases. HRQOL is narrowed to aspects of an individual's life that is affected by health, disease and/or its treatment. It encompasses many aspects as emotional, physical, social and subjective feelings of well-being that reflect an individual's subjective evaluation and reaction to his/her illness [15].

Main lines of the dietary interventions included embracing a thought of eating that is, with every taken bite, it is either de-flaming or inflaming. It is the whole diet including plant based diet (fruits and vegetables) at the base of the pyramid followed by the whole grains. Grass fed meat, skinless chicken, omega3 eggs and fish are best protein choices Eat until beginning to feel full and then stop. Diet excluded as ruled by diet principles were refined grains e.g. white bread and its sub-products. Partially hydrogenated oils found in margarine, deep fried and processed foods and most packaged foods, soda and sugar [16]. The role of nurses in different specialty and community health nurse as an educator regarding consuming balanced and performing exercise can be a safe and effective method of enhancing function and ultimately improving the patient's overall sense of well-being and quality of life [17].

2. Theoretical Definitions

Osteoarthritis refers to a clinical syndrome of joint pain accompanied by varying degrees of functional limitation and reduced quality of life. It is the most common form of arthritis, and one of the leading causes of pain and disability worldwide. The most commonly affected peripheral joints are the knees, hips and small hand joints. Pain, reduced function and affects a person’s ability to carry out their day-to-day activities that can be important consequences of osteoarthritis [18]

Health-related quality of life (HRQOL) is a multi-dimensional concept that includes domains related to physical, mental, emotional, and social functioning. It goes beyond direct measures of population health, life expectancy, and causes of death, and focuses on the impact health status has on quality of life [19].

Two basic approaches to quality-of-life measurement are available:

Generic instruments that provide a summary of HRQL; and specific instruments that focus on problems associated with single disease states, patient groups, or areas of function. They include health profiles and instruments that generate health utilities. Each approach has its strengths and weaknesses and may be suitable for different circumstances. Investigations in HRQL have led to instruments suitable for discovering minimally important effects in clinical trials, for assessing the health of populations, and for providing information for policy decisions [20].

3. Aim of the Study

Aim of the Study was to assess health related quality of life following dietary and exercise interventions among women with knee osteoarthritis.

Research Hypotheses

1. Women who will receive diet and exercise interventions may improve in their quality of life than those who will use diet only.
2. Women who will receive diet and exercise interventions may improve in their overall health status indicators than those who will use diet only.

4. Subjects and Methods

Design: A quasi-experimental design with pre/post -test was used.

Settings: The study was initially conducted at the physical therapy and orthopedic outpatient clinics of Tala central hospital as they considered the main clinics for managing osteoarthritis and had high daily patient rates for sample selection then through home visits for follow up of the sample. Diagnosis of OA was based upon criteria of the hospital departments.

4.1. Sample Calculation

According to the power analysis of this study using the following formula: n = (z) 2 p (1 – p) / E2 where P is the estimated proportion of the population, [21], it is equal 10 % for knee according to [22]. z = level of confidence according to the standard normal distribution (for a level of confidence of 95%, z = 1.96. E = tolerated margin of error (within 5%). So n= 3.8416* 0.10*(1-0.10)/0.0025 =138.2.

Sample: A total of 140 women were interviewed: a purposive sample of 138 women diagnosed of obesity and osteoarthritis. The researcher interviewed 138 women who agreed to participate in the study. They were selected according to the following inclusion criteria:

• Women who were 40 years and more and
• Diagnosed with OA.

Eighteen women dropped from the study and were not complied to continue for different reasons such as four of them travelled, one women died and thirteen withdrawn from the study due to in-commitment or decreased intention of the introduced interventions. Only 120 women were committed to the interventions. They were divided into two equal groups: 60 women received dietary pan with educational booklet only, and 60 received combined interventions included diet and exercises with an educational booklet.

The exclusion criteria was

• Women who have chronic diseases such as diabetes mellitus, heart diseases, liver and renal diseases and
• Women under specific dietary regime or depends on using analgesics or any forms of pain killers or uncommitted participants.

The researcher took their telephone numbers and home address after obtaining their consent and followed them up for 6 months of applying dietary program through home visit.

4.2. Instruments for Data Collection

1. An interviewing questionnaire to assess the following:

A. Socio demographic data included 3 questions about age, occupation and educational level.
B. Exercise practice including exercise modifications after intervention. It was developed by the researchers based on the current related literatures [12,13,17,23,24,25], to assess the patient's practices. Women were asked to respond by yes means positive attitude or no means negative attitude in 3 questions included using water exercise before walking, stretching then strengthening & stretching again and related to warming before exercise. Regarding length of practicing exercises, the responses were one hour, half hour to less than one hour (recommended) and more than one hour. Also in relation to number of times of practicing exercise, the responses were weekly, monthly and daily (recommended).

2. A modified version of eating pattern questionnaire, adapted from [26], for assessment and management of adult obesity. The researchers omitted the questions about following up special diet regime as they are excluded from the start of the study. Also, the researchers omitted food dairy as they introduced ready to use dietary plan. The researchers added questions about diet that can aid or hinder bone health as sea food and salt. So the questionnaire after modification included 12 items such as number of meals, fast meals, and consumption of fresh vegetables and fruits. The responses varied according to the meaning of each question.

3. Knee related quality of life questionnaire assessing quality of life domains adapted from [27,28]. It included 3 domains about number of times related to awareness of knee joint problems, troublesome with lack of confidence in knee joint and how much difficulty with knee joint. The item about lifestyle modifications to avoid potentially damaging activities to the knee joint were omitted as all participant women modified their life style due to the study recruitment. Each statement response was either by none (no trouble or difficulty

reported at all) or mildly, moderately, severely or extremely trouble reported.

4. A modified version of Medical Outcomes Study Questionnaire Short Form 36 Health Survey (SF-36) adapted from [29], to assess overall health in both physical (functional capacity) and social functioning. Each statement response was either by none, mild, moderate, severe or extreme.

4.3. Scoring System

Standardized answer options of none, mild, moderate, severe and extreme are given 5 scores ranging from 0 to 4 where none equal zero which meant there was no difficulty or trouble to extreme that meant the worst condition equal 4.

Validity: The questionnaire was reviewed for content validity by a five of experts in the field of Community Health Nursing and medical-surgical nursing.

Reliability: The researchers tested the internal consistency of the instruments. It is the administration of the same instruments to the same subjects under similar conditions on one or more occasions. The Cronbach' alpha for eating pattern questionnaire was 0.9. The test and retest reliability of the exercise practice questionnaire was 0.79. The Cronbach' alpha for Knee Injury and Osteoarthritis Quality of Life (KOQS) questionnaire was 0.9. The test and retest reliability of the modified version of Medical Outcomes Study Questionnaire Short Form 36 Health, was 0.88. A reliability of all instruments indicates a good reliability.

Pilot Study: A pilot study was conducted on 10 % of the study sample and was not included in the sample to ensure stability of the answers. It was conducted to test the readability of the questionnaire. It also helped to estimate the time needed to complete the questionnaires (25: 35 minutes).

4.4. Procedure for Data Collection

- Study period: Data were collected over period of ten months from June 2017 to March 2018.
- Approval: An official permission to carry out the study was obtained from the responsible authorities; health administration facility of Tala District and Tala Central Hospital by the researchers, where the data were collected to conduct the study after an explanation of the purpose of the study.
- Ethical Consideration: Each participant was requested to sign the consent form before completing the questionnaire. Confidentiality of any obtained information was ensured. Each participant was notified about the right to refuse to participate in the study, before taking her verbal consent. Both groups were given a copy of colored booklet with food and exercise plans.

For the Interventions group (diet and exercise group)

- **Initial visit:** The obtained pre-test served as baseline assessment of the participant women.
- In addition to walking and water exercises, 2 types of exercises were used including stretching and strengthening exercises. These exercises were done at one session repeated 4:5 times per week.
- Interventions applied dietary meals of 1500 to less than 2000 calories implemented for diet only group; it was accompanied with exercise for the diet and exercise group.
- The Designed nursing interventions consisted of three components:

I. Dietary Education: about dietary guidelines for appropriate eating pattern of food that aids in building cartilage and healthy bone that were and based on plant and sea sources and banned foods.

II. Exercise Education: Information about knee exercises included general guidelines of walking for half to less than an hour, warming stretching and strengthening exercises and the target muscles of each and exercise to be avoided as jumping and running.

III. Education about unhealthy habits practices that should be avoided such as pickles and soda avoidance or skipping meals and fast foods.

The interventions were implemented for 6 months for each participant in the mentioned settings. Each participant woman interviewed for 12 sessions, session every 2 weeks and 2 hours for each session. Each participant woman was followed at home. A group of women, who lived in the same location, were interviewed together (maximum 10 for each group) and the others were interviewed individually. At the beginning of the first session, an orientation to the educational interventions and their purposes took place.

Each session started by a summary about what was given through the previous session, feedback from participants then turned to the next session. The researcher took into consideration using simple and clear language to suit the educational level of participants. To ensure exposure of the same learning experience, all participants received the same booklet which included a meal plan of plant based and low caloric diet from (1500 to less than 2000 diet plan designed for fourteen days as a suggested plan). It was chosen from a list that could help cartilage and bone health. Combined interventions group received both dietary plan and exercise package. At the same time exercises are refrained from the booklet for the group of diet only to enable researcher to isolate the dietary effect only and to evaluate the combined ones.

• Final visit (post interventions- test): Evaluation

The researcher re-administered the study questionnaire to evaluate the effect on the general health and quality of life domains (post- test).

4.5. Statistical Analysis

The data was tabulated and analyzed by using SPSS program (statistical package for social science software) version 18. A qualitative data was expressed in numbers and percentage (No. & %). χ^2 and P value to test and the relationships among quantitative variables, Statistical significance was started at p-value <0.05.

5. Results

Table 1 reveals demographic data of the studied obese women with knee osteoarthritis (n=120), 60% & 46.7 %

of the diet only & the diet and exercise groups respectively are between 40- <45 years old. The findings of the current study showed that majority of participant women were between 40- 46 years old.

Table 2 shows significant improvement between the two groups regarding number of daily consumed meals, number o of times of consuming sea food/week, method of preparing food/ the most used method for food preparation, the skipped meal, consuming recommended spices (Turmeric / curcumin-ginger), Necessity of pickles in meals & consuming fast foods.

Concerning the number of daily consumed meals, 50 % & 24% of diet only group and diet and exercise group respectively reported three to five before the intervention increased to 90 % & 95 % of both groups after the intervention respectively.

Concerning no of skipped meals, Also, it revealed that, 31.7 % and 40 % of diet only group and diet and exercise group respectively reported no skipped meals before the intervention turned to 100 % of both groups after the intervention.

Regarding Consuming recommended spices (Turmeric / curcumin-ginger), 66.7 % & 51.7 % of diet only group and diet and exercise group respectively reported turned to 100% &96.7 % of both groups respectively after the study.

Preferring vegetable salad with meals or during the day were represented as 88.3 % & 85 % of diet only group and diet and exercise group respectively who consumed it before the program turned to 100% of both groups after the program. Also regarding preferring fresh fruits with meals or during day, 86.7 % of both groups turned to 100% of them after the interventions insignificantly.

Necessity of pickles in meals 33% & 40 % of diet only group and diet and exercise group respectively reported consuming them turned to 3.3 % and 0 % of both groups after the study respectively.

Regarding consuming fast foods 70% & 63 % of diet only group and diet and exercise group respectively who reported no consuming before the program turned to 93.3% and 100 after it for both groups.

Table 3 shows exercise practice revealing significant difference in all its domains as regarding number of times of practicing exercise, 66 % turned to 73 % who practice weekly exercises. Also regarding number of times of walking per week, 8.3 % turned to 100% who walked5 and more times /wk. Concerning Using water exercise for the painful knee before walking, 0% of the participants turned to 78.3% after the program. Regarding Stretching then strengthening and Stretching again, 0% of participants before the program turned to 100 % who practiced them after the program.

Table 4 illustrates the effect on quality of life; there was more improvement of diet and exercise group regarding the determined aspects of quality of life including awareness of knee problem, troublesome with lack of confidence in knee joint and degree of difficulty with it. It indicates significant improvement regarding troublesome with lack of confidence in knee joint as, 13.3 % & 6.7 % of diet only and diet and exercise group respectively reported mild before the intervention, increased to 26.7 % & 53.3 % after the intervention respectively.

Figure 2 shows more improvement for the diet and exercise group than diet only group. As 13 % & 20 % of the of diet only group and diet and exercise group reported no limited role before the intervention increased to 27 % & 50 % respectively after the intervention.

Figure 3 shows social functioning: interference of knee problem with normal social activities with family, friends, jobs or groups. There was more improvement of the diet and exercise group than the diet only group as, 8 % & 20 % of diet only and diet and exercise groups who reported no interference respectively before the intervention, turned to 14 % & 30 % of them respectively after the intervention.

Table 1. Distribution of Demographic data of the studied obese women with knee osteoarthritis (N=120)

Demographic data	Knee joint N=(120)			
	Group A (60)		Group B (60)	
	No.	%	No.	%
▪Age years:				
40-	36	60.0	20	33.3
46-	16	26.7	28	46.7
56-	4	6.7	4	6.7
60& more	4	6.7	8	13.3
χ^2 P	3.853 0.310			
▪Occupation:				
Worker	8	13.3	4	6.7
Employee	24	40.0	32	53.3
House wife	28	46.7	24	40.0
χ^2 P	0.400 0.819			
▪Educational level:				
Illiterate	0	0	0	0
Read & write and primary educ.	12	20.0	4	6.7
Preparatory & secondary educ.	28	46.7	40	66.7
High educ.	20	33.3	16	26.7
χ^2 , P	1.641 P 0.440			

*Significant (P<0.05).

Table 2. Effect of interventions on eating pattern of the studied women with osteoarthritis

Eating pattern items	The studied obese women with osteoarthritis (N=120)									
	Group A (Diet only) (n=60)				χ^2 P	Group B (Diet & Exercise) (n=60)				χ^2 P
	Before Intervention		After Intervention			Before Intervention		After Intervention		
	No.	%	No.	%		No.	%	No.	%	
▪ The number of daily consumed meals:-										
Two	30	50	6	10	22.857	36	60	3	5	41.368
Three-Five	30	50	54	90	0.001*	24	40	57	95	0.001*
▪ Preferring vegetable salad with meals or /day:-										9.730
Yes	53	88.3	60	100	7.434	51	85	60	100	0.003*
No	7	11.7	0		0.013	9	15	0	0	
▪ Preferring fresh fruits with meals or during day:-										
Yes	52	86.7	60	100	8.571	52	86.7	60	100	8.571
No	8	13.3	0		0. .006	8	13.3	0	0	0.006
No of times of consuming sea food/week										
1:2/ week	30	50	54	90	24.617	22	36.7	51	85	30.828
More than 2	19	31	6	10	0.001*	30	50	9	15	0.001*
No	11	18.3	0			8	13.3	0	0	
▪ Method of preparing food/										
Baked	3	5	34	56.7	61.306	6	10	32	53.3	46.321
Broiled	14	23.3	0		0.001*	14	23.3	2	3.3	0.001*
Fried	21	35	0			19	31.7	0	0	
Boiled	22	36.7	26	43.3		21	35	26	43.3	
▪ The skipped meal:										
Breakfast	23	38.3	0		62.278	24	40	0	0	51.429
Lunch	9	15	0		0.001*	8	13.3	0	0	0.001*
Dinner	9	15				4	6.7	0	0	
None	19	31.7	60	100		24	40	60	100	
Consuming recommended spices(Turmeric / curcumin-ginger):										
Yes	40	66.7	60	100	24.000	31	51.7	58	96.7	31.707
No	20	33.3	0	0	0.001*	29	48.3	2	3.3	0.001*
▪ consuming omega3 sources(olive oil-nuts-seeds)										
Yes	47	78.3	50	83.3	0.484	32	53.3	48	80	9.600
No	13	21.7	10	16.7	0.643	28	46.7	12	20	0.003*
▪ The prefer quantity of salt :										
Large	10	16.7	1	1.7	10.838	20	33.3	2	3.3	18.507
Average	30	50	26	43.3	0.004	18	30	22	36.7	0. .001*
Little	20	20	33	55		22	36.7	36	60	
▪Necessity of pickles in meals:										
Yes	20	33.3	2	3.3	18.033	24	40.0	0	0	51.429
No	40	66.7	58	96.7	0.001*	36	60.0	60	100	0.001*
▪The preferred juices or foods:										
Canned juices	8	13.3	0	0	27.637	3	5	0	0	46.966
Fresh juices	20	33.3	14	23.3	0.001*	23	38.3	6	10.0	0.001*
Soda	10	16.7	0	0		14	23.3	0	0	
Chocolate	10	16.7	23	38.3		18	30.0	54	90	
Nuts	12	20.0	23	38.3		2	3.3	0	0	
▪ Consuming fast foods:										
Yes	18	30	2	6.7	15.360	22	36.7	0	0	26.939
No	42	70	58	93.3	0.001*	38	63.3	60	100	0.001*
If yes, how often?:										
Daily	4	22.2		0	1.481	6	27.3	0	0	-
Weekly	4	22.2		0	0.477	4	18.2	0	0	
Monthly	10	55.6	2	100		12	54.5	0	0	

*Significant (P<0.05).

Table 3. Exercise practice among diet and exercise group with knee joint osteoarthritis (N=60)

Exercise data	Group B (Diet & Exercise) (n=60)				
	Before Intervention		After Intervention		χ^2 P
	No.	%	No.	%	
▪How often do you practice exercise:					
Weekly	40	66.7	44	73.3	60.016
Monthly	15	25	16	26.7	0.001*
Daily	5	8.3	0	0	
None	0	0	0	0	
Length of it during the day :					
-One hour	7	11.7	23	38.3	36.347
-half hour to less than one hour	53	88.3	22	36.7	0.001*
-More than one hours	0		15	25	
▪number of times of walking per week					
1:2	1	1.7	0	100	101.538
3:4	54	90	0		0.001*
5 and more	5	8.3	60		
▪Using water exercise for the painful knee before walking.					
-Yes	0	0	47	78.3	77.260
-No	60	100	13	21.7	0.001*
▪Stretching then strengthening and Stretching again					
-yes	0	0	60	100	120.000
-no	60	100	0	0	0.001*
▪warming by 5:10 minutes of walking before exercises:					
Yes	14	23.3	60	100	74.595
No	46	76.7	0	0	0.001*

Answer for hypothesis 1

Table 4. Effect on quality of life of the studied women with knee osteoarthritis before and after Intervention (N=120)

	The studied obese women with Knee joint osteoarthritis (N=120)										Group A after vs Group B after	
Effect on quality of life	Group A (Diet only) (n=60)				χ^2 P	Group B (Diet & Exercise) (n=60)				χ^2 P	χ^2	P
	Before Intervention		**After Intervention**			**Before Intervention**		**After Intervention**				
	No.	**%**	**No.**	**%**		**No.**	**%**	**No.**	**%**			
▪How often are you aware of your joint problems?												
Daily	24	40.0	12	20.0	1.490	0	0	0	0	0.130	3.600	0.165
Weekly	16	26.7	24	40.0	0.474	32	53.3	24	40.0	0.714		
Monthly	20	33.3	24	40.0		28	46.7	36	60.0			
▪How troubled are you with lack of confidence in your joint?												
Severe	32	53.3	20	33.3	1.450	16	26.7	12	20.0	8.160	2.233	0.327
Moderate	20	33.3	24	40.0	0.484	40	66.7	16	26.7	0.017*		
Mild	8	13.3	16	26.7		4	6.7	32	53.3			
▪In general, how much difficulty do you have with your joint?												
Severe	28	46.7	20	33.3	1.860	20	33.3	8	13.3	3.330	3.333	0.189
Moderately	28	46.7	40	66.7	0.394	40	66.7	44	73.3	0.189		
Mild	0	0	0	0		0	0	8	13.3			
Extreme	4	6.7	0	0		0	0	0	0			

***Significant (P<0.05).**

Answer hypothesis (2): Social functioning: interference of knee problem with normal Social activities with family, friends, jobs or groups before and after interventions (N=120)

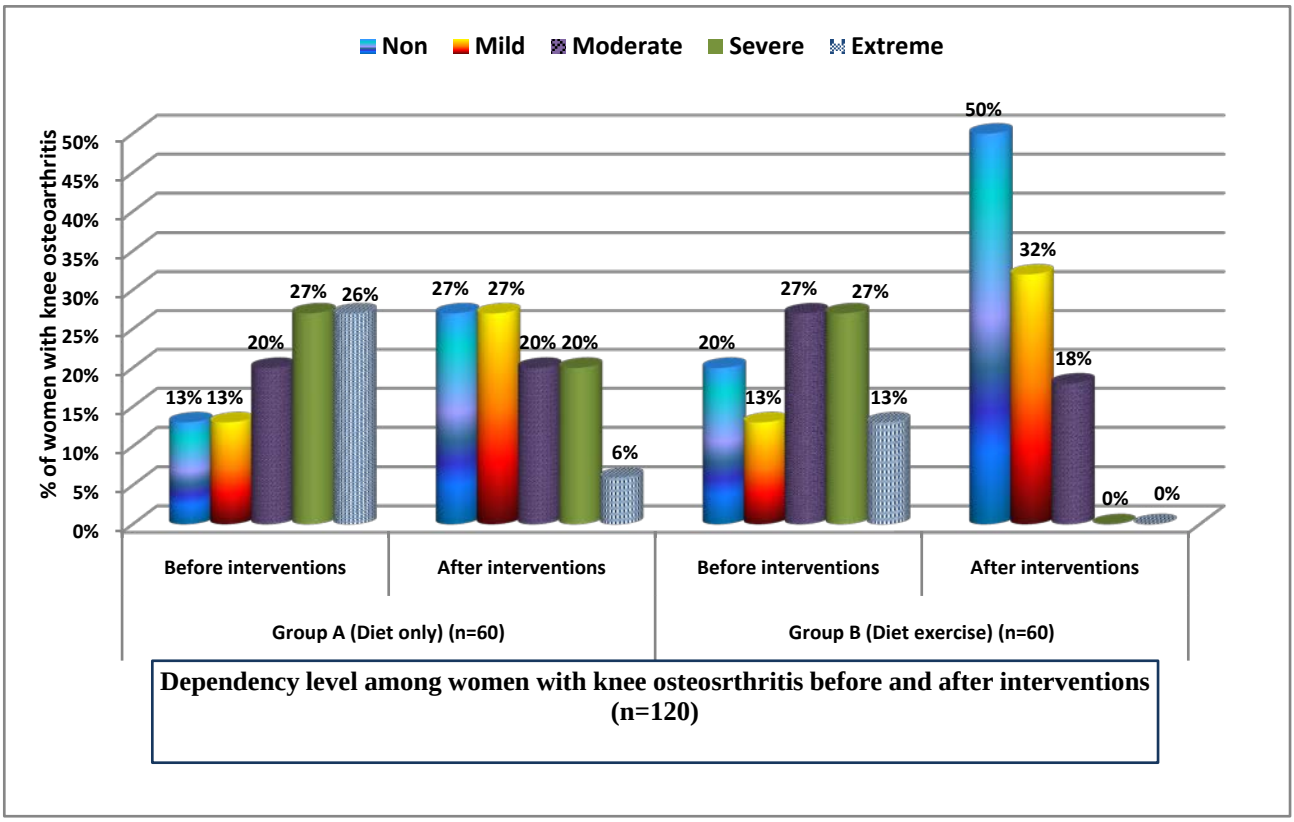

Figure 2. Dependency level (role limitation due to knee problem) among women with knee osteoarthritis before and after interventions (N=120)

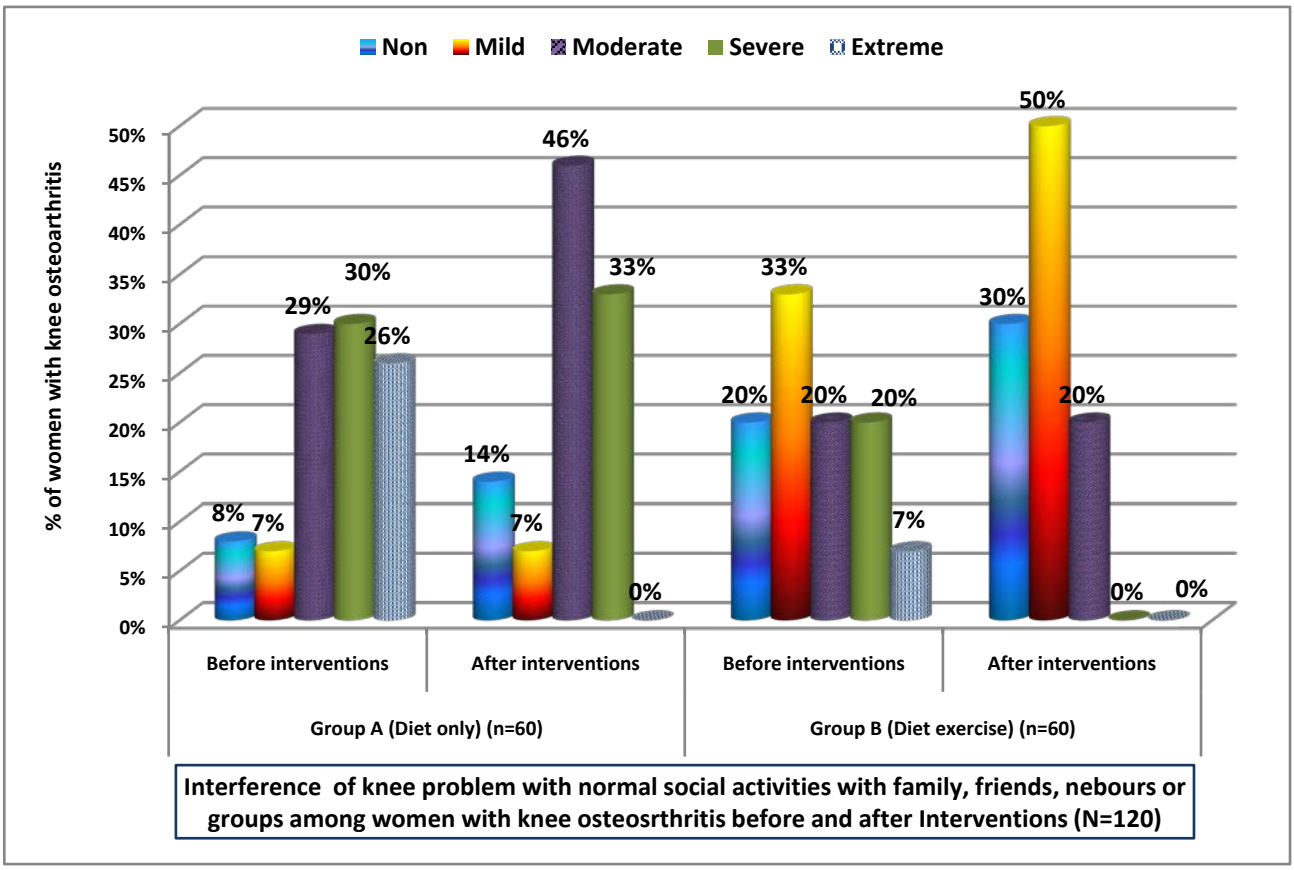

Figure 3. Social functioning: interference of knee problem with normal social activities with family, Friends, jobs or groups before and after interventions

6. Discussion

Disability due to osteoarthritis (OA) and increasing disease prevalence create a major public health problem. By 2020, the number of people with OA will have doubled, due in large part to the exploding prevalence of obesity and the graying of the "baby boomer" generation Osteoarthritic patients also experience limited daily usual activities diminished quality of life aspects and economic hardship. Of all the types, OA of the knee is more common as a weight bearing joint [30], Despite growing concern, there remain few safe and effective interventions of life style modification, as the current clinical management for OA is often limited to the use of analgesic and/or anti-inflammatory medication for the eventual referral for total joint replacement [31].

6.1. Dietary Pattern

The current study revealed significant improvement between the two groups regarding number of daily consumed meals, number o of times of consuming sea food/week, method of preparing food/ the most used method for food preparation, the skipped meal, consuming recommended spices (Turmeric/curcumin-ginger), necessity of pickles in meals & consuming fast foods through assessing dietary pattern. This indicated a clear adherence to the dietary intervention during the period of study. These results were supported by Mikkila et al., [32] who reported that dietary patterns can be helpful in evaluating adherence to certain diets over time and risk of disease. Dietary tracking contributes to maintenance of nutrient intakes, food consumption or dietary habits.

The present study revealed that regarding the number of daily consumed meals, half & quarter of diet only group and diet and exercise group respectively reported three to five before the intervention increased to majority of both groups after the intervention respectively. Also, it revealed that, about third and two fifth of diet only group and diet and exercise group respectively reported no skipped meals before the intervention turned to 100 % of both groups after the intervention, increased among the majority of the women of both groups after interventions. This is in accordance with the Dietary Guidelines for Americans [33] who advised to keep a regular meal schedule by eating small frequent meals. This could be because small frequent meals can help prevent from getting too hungry, which can lead to overeating. This approach also feeds brain a steady supply of glucose which helps to keep cravings at a minimum. Guidelines also confirmed not to skip breakfast as it is associated with reduced problem solving ability, lower energy and decreased motivation. Eating breakfast may also help to manage hunger and food intake throughout the day.

Also, consuming recommended spices (turmeric / curcumin-ginger): all of diet only group and more than half of the combined group consumed them. This is in accordance with **[25] i**n an article addressed "What Are the Differences between Ginger and Turmeric" reporting that the active ingredient in turmeric is an antioxidant plant pigment called curcumin. Turmeric also contains a compound called zingiberene, which is found in its relative, ginger, as well. Like ginger, turmeric has anti-inflammatory properties, and it is sometimes used to treat inflammatory conditions such as osteoarthritis**.**

The current study indicated a statistical positive dietary modifications including, preferring vegetable salad with meals or during it as the majority of diet only group and diet and exercise group respectively who consumed it before the interventions turned to all of them after it. Also regarding preferring fresh fruits with meals or during day, majority of both groups turned to all of them after the interventions insignificantly. This finding is supported by Bruso, [34] who reported that fruits and vegetables in general are rich in antioxidants, such as flavonoids, carotenoids and vitamins A, C, B and E. These antioxidants help reduce inflammation. Also, Welch [35] stated that leafy greens vegetables are rich in vitamin K also aids in cartilage repair. This may be attributed to the reason it activates matrix Gla protein, a protein essential for new cartilage growth. It also supports the development of new bone tissue.

Regarding necessity of pickles in meals, the current study revealed that third and two fifth of diet only group and diet and exercise group respectively reported consuming them turned to no one of both groups after the study. This is in accordance with Lynda, et al., [36] who studied the adverse effects of sodium chloride on bone in the aging human populations resulting from habitual consumption of typical American diets, reported that, habitual salt excess may contribute to bone loss and postmenopausal women are more sensitive to the calcium-losing effect of NaCl than premenopausal women.

Also, regarding prevention of fast foods, after the intervention, the majority of the two groups reported no consumption of fast food. This is in accordance with, Canada's Food Guide and The arthritis Society [37] who mentioned that, generally, high amounts of sodium and trans-fats are found in processed and fast foods (e.g., frozen meals, packaged baked goods, pre-packaged and canned soup, pickles, salty snack foods, gravies and other sauces).

6.2. Practicing Exercises

The study indicated positive modification of exercise pattern regarding daily length, walking and water exercise and in relation to performing stretching then strengthening and stretching finally. This is in the same line with Hurley et al., [38] who studied the clinical effectiveness of a rehabilitation program integrating exercise, self-management, and active coping strategies for chronic knee pain, they reported that, physical activity confers a range of health benefits including joint health, muscle strength and weight management.

The effect of diet and exercise interventions on the perceived quality of life:

HRQL encompasses emotional, physical, social and subjective feelings of well-being that reflect an individual's subjective evaluation and reaction to his/her illness. HRQOL is of special importance in evaluating the effects of treatment or medical condition [39]. The results of the current study indicated more improvement of diet and exercise group regarding the determined aspects of quality of life after the intervention. It included awareness of knee problem, troublesome with lack of confidence in knee joint and the degree of difficulty with it. It indicated

significant improvement regarding troublesome with lack of confidence in knee joint as, minority of both groups reported mild trouble before the intervention, increased to more than quarter of the diet only group & more than the half of the diet and exercise group after interventions. This is due to replacing daily and weekly sufferings. This is in the same line with Rejeski et al., [40] who performed a study on obese, older adults with knee osteoarthritis: Weight loss, exercise, and quality of life. They examined the effects of dietary weight loss and exercise on the health-related quality of life (HRQL) of overweight and obese, older adults with knee osteoarthritis. Results revealed that the combined diet and exercise intervention had the most consistent, positive effect on HRQL compared with the control group; however, findings were restricted to measures of physical health or psychological outcomes that are related to the physical self.

Regarding the role limitation due to knee problem among women with knee OA**,** the findings of the current study showed more improvement for the diet and exercise group than diet only group. As less than the fifth and fifth of diet only group and diet and exercise group reported no role limitation of their knee before the interventions increased to more than quarter & half of diet only and diet and exercise groups respectively after the interventions. This is in accordance with WHO, [41] who reported the impact of arthritis on health related quality of life is 80 % of patients with OA have movement limitation. This is in same line with Richmond et al., [42] who studied treatment of osteoarthritis of the knee using regular physical activity, especially low-impact aerobic exercise and quadriceps strengthening programs to be strongly encouraged in the knee OA patient. Consequently, the investigated QOL is positively affected.

This is contradictory to Bennel et al., [23] who studied efficacy of physiotherapy management of knee joint osteoarthritis a randomised double blind placebo controlled trial, as they reported that the evidence supporting physical activity participation on improving HRQoL is limited, variable, and highly dependent on the exercise modality. Bennell et al., reported that HRQoL was no different in patients undergoing a 12-week multi-modal physiotherapy program. This may be due to varied commitment, design or educational and motivational methods.

Whereas, Kawano et al., 2015, [43] who studied "Assessment of quality of life in patients with knee osteoarthritis". They concluded that individuals with osteoarthritis have a low perception of their quality of life in the domains functional capacity, functional limitations and pain. There is a strong association between low educational level and low quality of life. This finding was also related to the fact that individuals with low education are engaged in physical work activities and higher impacts. Also the National Clinical Guideline Centre (UK) (2014) [18], stated that Osteoarthritis refers to a clinical syndrome of joint pain accompanied by varying degrees of functional limitation and reduced quality of life. It is the most common form of arthritis, and one of the leading causes of pain and disability worldwide.

Regarding social functioning, the study indicates more improvement for the diet and exercise group than diet only group. As less than the fifth & the fifth of the of diet only group and diet and exercise group reported no interference before the interventions increased to less than the quarter & a third of them respectively after the interventions. This is in the same line with Monique et al., [44] who studied social role participation and the life course in healthy adults and individuals with osteoarthritis, overlooking the impact on the middle-aged; they reported that people with OA experience have risk of financial stress, and loss of the social and esteem functions fulfilled by work. Thus, health related quality of life is a long run indicator to study the effects of the disease and interventions on physical and social functioning.

7. Conclusions

Health related quality of life (HRQOL) is of special importance in assessing the effects of diet and exercise on the quality of life of osteoarthritic knees patients. This study described desired changes with mild or moderate or more improvement in HRQOL attributable to applying dietary and exercise interventions for women with knee OA than those who received diet only intervention.

8. Recommendations

- Nurses should provide health education regarding knee osteoarthritis and its association with dietary habits.
- Lifelong physical activity is strongly recommended for the improving knee osteoarthritis including walking, water strengthening and stretching exercises in a moderate manner. Thus, education on the necessity for moderate exercise with well-balanced diets based on plant sources can improve quality of life.
- Consuming well-balanced diet stressing fresh fruits and vegetables, sea food, low salt diet and healthy spices including ginger and turmeric is recommended.

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