

Effectiveness of the Educational Program Regarding Eating Disorders among Girl Students at Preparatory Schools in Assiut City

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Abstract

Background: Eating disorders (EDs) are a major public health issue faced by female students. **The aim of this study** was to evaluate the effectiveness of the educational program regarding eating disorders among Preparatory School Girls. **Methods:** The study employed a quasi-experimental research design. The study focused on four randomly selected secondary girls' schools in Assiut City, selected through a simple random sampling method. Multi stage random sample was used in this study. The sample size was 376 students. Data was collected using a self-administered structured questionnaire which included demographic characteristics of students, Body Mass Index, assess the students' knowledge regarding eating disorders, The Eating Disorder Examination Questionnaire. **Results:** the study comprises younger adolescents aged 11-13 years (61.4%), with a significant majority residing in urban areas (97.1%), 16.3 % of them had eating disorders, 76.1% of participants following a non-vegetarian diet and 23.9% adhering to vegetarianism. the examined girls initially possessed inadequate knowledge (93.3%), following the program, three-quarters of them (75.0%) transitioned to a state of good knowledge. No significant differences were found between demographic characteristic in both pre and post-test knowledge scores. **Conclusion:** The findings indicate an improvement in knowledge scores and a positive effect on reducing concerns and behaviors associated with eating disorders. **Recommendation:** Further studies on larger sample size among different groups and settings are needed for generalization of the study.

Keywords: Adolescent Girls, Eating Disorders & Educational Program

Introduction

Adolescence represents a crucial phase in the emergence of eating disorders (EDs), with a prevalence of 1-3% among adolescents, and around 30% of adolescent girls exhibiting subclinical disordered eating (Breton et al., 2022). EDs, classified as the third most common chronic illness in adolescent females, affecting up to 5%, can lead to severe complications, especially when the risk factors didn't detect and diagnosis or treatment is delayed (Ali & Shehata, 2020).

Eating disorders are complex, potentially life-threatening conditions characterized by disruptive eating behaviors that significantly impact physical and psychosocial functioning. Eating disorders are associated with high mortality rates, impaired quality of life, and increased health care costs that typically manifest during adolescence (Chew & Temples, 2022).

Various factors contribute to the development of eating disorders, including genetics, brain biology, personality traits, and cultural influences. According to the Diagnostic and Statistical Manual of Medicine Disorders-5, the two main types of EDs are Anorexia Nervosa (AN) and Bulimia Nervosa (BN). Additionally, there are other types of eating disorders

such as binge eating, muscle dysmorphia, drunkorexia, pregorexia, pica, and avoidant/restrictive food intake disorder (Nagarale et al., 2022).

An individual with an eating disorder may initially alter their food intake, whether by eating smaller or larger amounts, but the urge to control their eating can escalate. Significant distress or preoccupation with body weight or shape can also indicate an eating disorder (Goswami et al., 2022; Kumar, 2020). The surge in Eating disorders cases during adolescence may be attributed to sociological and cultural changes, as students often become independent in managing their eating habits, purchasing food, preparing meals, and scheduling their eating routines. These factors can lead to skipped meals, a preference for fast food, alcohol consumption, and ultimately, changes in weight and body composition (Martínez-Rodríguez et al., 2023).

The consequences of eating disorders can be severe and increase the risk of obesity, substance abuse, deficiency diseases, anxiety disorders, cardiovascular symptoms, chronic fatigue, depressive disorders, infectious diseases, insomnia, and neurological symptoms (Hourani et al., 2020; Kjeldbjerg & Clausen, 2023).

Mortality rates for EDs are significantly higher than in the general population, with the highest rates observed in Anorexia Nervosa due to its impact on the cardiovascular system and suicide. Elevated mortality rates are also seen in Bulimia Nervosa and Other Specified Feeding and Eating Disorder (OSFED) (Bryant et al., 2022; Hambleton et al., 2021).

Numerous guidelines, including those established by the American Psychiatric Association (APA) and the National Institute of Clinical Excellence (NICE), outline diagnostic and treatment protocols for eating disorders (EDs). These guidelines advocate for a specialized team approach, emphasizing comprehensive evaluations encompassing clinical, psychological, and social aspects (Foà et al., 2019). Community health nurses and Case/Care Managers assume a pivotal role in patient care, serving as a crucial link between hospital settings and community-based care. Despite this vital role, in practical terms, their involvement tends to be more peripheral when compared to the prominence of medical professionals. However, there is a notable lack of understanding among health care providers when implementing ED prevention programs in schools, primarily due to limited training on healthy eating habits and ED prevention strategies (Al Shanbari et al., 2023).

Significance of study

Eating disorders (EDs) stand out as a prevalent issue among adolescents, with the highest mortality rates among all mental disorders. The prevalence of eating disorders had increased from 3.5% in the 2000–2006 periods to 7.8% in the 2013–2018 periods. A recent review of studies in the Arab world found that the prevalence of eating disorders varies between 2 and 54.8%, with a higher risk of binge eating among Kuwaiti and Egyptian Arabs (Hoteit et al., 2022). According to study is applied on Egyptian schools in Assiut city cleared that more than half (53.0%) of the studied sample had eating disorders, 54.1% of them had anorexia and 45.9% of them had bulimia (Abd El-hafeez et al., 2018).

Additionally, the repercussions of EDs are severe, heightening the risk of developing obesity, substance abuse, deficiency diseases, anxiety disorders, cardiovascular symptoms, chronic fatigue, pain, depressive disorders, infectious diseases, insomnia, neurological symptoms and dietary inadequacy (Hambleton et al., 2021). Eating disorders can damage multiple organ systems and significantly impact the future health of adolescents (Breton et al., 2022; Chew & Temples, 2022).

Aim of the study

Evaluate the effectiveness of the educational program regarding eating disorders among preparatory school girls.

Research hypothesis:

Null Hypothesis (H0): There is no significant difference in the Knowledge of eating disorders among adolescent girls before and after the implementation of the educational program.

Alternative Hypothesis (H1): The educational program leads to a significant improvement in knowledge resulting in a decrease in the incidence of disordered eating behaviors and promoting healthier body image perceptions.

Subject and Methods

Research design:

The study employed a quasi-experimental research design.

Setting

Assiut City comprises twelve government preparatory girls' schools, with six located in the eastern part and the remaining schools situated in the western part. The study focused on four randomly chosen secondary girls' schools in Assiut City, selected through a simple random sampling method.

Sample:

Multi stage random sample was used in this study. The total number of students in selected randomly schools were 376 students.

Sample Size

The sample size determination utilized Open EPI info 3.01, considering a reported prevalence of eating disorders at 53% based on the findings of (Abd El-hafeez et al., 2018). A confidence level of 95%, confidence limit of 5%, and a design effect of 1 were incorporated into the calculation, resulting in an initial sample size of 313. To account for potential non-response, the sample size was subsequently increased to 376. The participants were randomly selected from each grade, and the distribution of the sample across schools was proportionate to the respective school sizes, as determined by the following equation:

$$\frac{\text{The Total number of students in each schools}}{\text{Total number of students in the selected school}} \times \text{estimated sampling size by EPI/info}$$

Table (1): Sample size of students in each school

School name	Total number students	Sample size	%
Al-Nahda school	520	115	31%
Aisha Girls School	340	75	20%
El khayat school	280	62	16%
El-waledia preparatory girls	560	124	33%
Total	1700	376	100%

Tools of the study:**Two instruments was used**

Instruments (I): The researchers designed a self-administered structured questionnaire for data collection, comprising three segments:

Segment (1): Gathered demographic Characteristics of students, such as age, academic stage, living area, and educational and occupational information of both parents.

Segment (2): Calculated the Body Mass Index (BMI) following the **WHO's 2024** guidelines, with the formula: $BMI = \text{weight in kg} / (\text{height in m})^2$. The classification was as follows: 1) Underweight: $< 18.5 \text{ kg/m}^2$, 2) Normal: $18.5 - 24.99 \text{ kg/m}^2$, 3) Overweight: $\geq 25 \text{ kg/m}^2$ (**WHO, 2024**).

Segment (3): Aimed to assess the students' knowledge regarding eating disorders. It comprised of 9 inquiries about definitions, types, specific disorders like anorexia and bulimia nervosa, factors contributing to these disorders, symptoms, complications, and prevention (**Goswami et al., 2022; Napolitano et al., 2019; Datta et al., 2018**).

Knowledge was scored out of 24, with correct answers receiving one point and incorrect or unknown responses receiving zero. In cases of multiple correct answers, the scores for each response were added and converted into a percentage. Knowledge levels were categorized as: Poor = $< 50\%$, Fair = $50-70\%$, Good = $> 70\%$ (**Kamel et al., 2019**).

Reliability of the Instrument: The questionnaire demonstrated a high level of reliability with a Cronbach's alpha value of 0.861.

Instruments (II): The Eating Disorder Examination Questionnaire (EDE-Q), originally developed by (**Fairburn & Cooper, 1994**), was employed to assess disorders related to eating behaviors. This questionnaire focuses on participants' eating patterns and self-perception over the preceding 28 days and includes four subscales that gauge the severity of eating disorder psychopathology

Scoring system

The subscales are: restraint, eating concern, shape concern, and weight concern. To calculate the subscale scores, the scores for the relevant questions are summed and then divided by the number of items in each subscale. This scale is utilized for comparing different demographic groups or for assessing the general eating behavior profile within a population.

Reliability of the instrument: The Eating Disorder Examination Questionnaire demonstrated high reliability, with a Cronbach's alpha value of 0.877.

Validity: Validity was done for instrument I & II which presented by asking 5 experts in the field of community health nursing. Modifications were done according to the jury's comments on clearness of sentences and the suitability of the contents.

The study phases

Administrative Procedures: The research team secured official authorization from various administrative bodies to conduct the study. Initially, an approval letter was acquired from the Dean of the Faculty of Nursing at Assiut University. This letter facilitated further permissions from the Assiut Directorate of Education, followed by the Central Agency for Public Mobilization and Statistics, and subsequently the Centralized Management of Security. The final approval was obtained from the school directors, which included authorization for the implementation of the study in their respective institutions.

Pilot study:

Before initiating the main data collection, a preliminary study was conducted on 10% of the adolescent student sample. The primary objectives of this pilot study were to evaluate the clarity and understandability of the research instruments and to gauge the time needed for participants to complete the questionnaire and the pilot was included to the study.

Ethical Considerations:

The research proposal received approval from the Ethical Committee of the Faculty of Nursing at Assiut University. Throughout the study, the students under investigation were not subjected to any risks. Standard ethical principles for research were adhered to. After providing a detailed explanation of the study's nature and objectives to interested students, verbal consent was obtained from them. Assurances of anonymity and confidentiality were provided. Participants were given the freedom to opt out of participation or withdraw from the study at any point without the need for justification, and privacy considerations were diligently observed during the data collection process

Data Collection

Data was collected from the first of October 2021 to March 2022, three days weekly. Filling questionnaire was taking approximately 25 to 30 minutes. Oral consent was obtained from studied students to participate in this study, and a clarification of the purpose of the study was presented to the studied students to get their cooperation before beginning data collecting. The teaching methods were explained to the students before starting the program intervention. Each session started by reviewing the previous lesson to assess students' knowledge before the program. Based on the Eating Disorder Examination scale, students with eating disorders were identified in four schools and then divided into five groups, each with 9–12 students. Post-test after two months of the educational program was done to evaluate the knowledge gained.

Description of the educational program:

The program content was developed by drawing insights from pertinent literature and existing resources that elucidate eating disorders and their associated health issues. The primary goal was to augment the understanding and preventative awareness among adolescents' girls. The content encompasses comprehensive information, covering the definition of eating disorders, various types, risk factors, signs and symptoms, underlying causes, and preventive measures for each type of eating disorder.

Objectives of the program:**General objectives of the program**

The overall objective of the educational program is to evaluate the effectiveness of the educational program regarding eating disorders among adolescent girls.

Specific objectives

1. Evaluate students' comprehension of health issues associated with eating disorders.
2. Develop and execute an educational health program focused on the prevention and management of eating disorders.
3. Appraise the effectiveness of the educational health program through assessment and analysis.

The educational program content:

The content provided will cover a comprehensive understanding of eating disorders, including the following aspects:

1. Definition of Eating Disorders
2. Types of Eating Disorders
3. Signs and Symptoms of Eating Disorders
4. Causes of Eating Disorders
5. Risk Factors of Eating Disorders
6. Definition, causes, Signs and Symptoms, and Complications of Anorexia Nervosa
7. Prevention of Anorexia Nervosa
8. Definition, causes, Signs and Symptoms, and Complications of Anorexia Nervosa
9. Definition, causes, Signs and Symptoms, and Complications of Binge Eating Disorder.

Phases of educational program**Assessment Phase**

A pretest evaluation of students' knowledge about eating disorders indicated a lack of awareness, leading to the development of an educational program aimed at enhancing their understanding. It began on the first of October and over four weeks. Three days weekly. The questionnaire was taking approximately 25 to 30 minutes.

Planning Phase

The program's sessions and schedule were established. Students identified with eating disorders were divided into four groups. Preparations during this phase included organizing the teaching venue, teaching methods, and audiovisual aids Teaching was conducted in available spaces (classrooms and school

health rooms) in each selected school, in coordination with the school directors. Teaching methods and materials were prepared beforehand, incorporating lectures, discussions, brainstorming, and various media like pictures, handouts, and posters.

Implementation Phase

This phase spanned duration of six weeks, commencing from the first week of November 2023 and concluding in the second week of December 2023. The sessions were structured in a sequence of three days per week. Using the Eating Disorder Examination scale as a basis, the targeted sample, comprising 60 students with eating disorders, was divided into five groups, each consisting of 9-12 students. The program was executed for each group, with every group undergoing three sessions. Each session per day lasted approximately 90 minutes, encompassing various activities and discussions.

The educational program comprised three sessions. In the **initial session**, participants were introduced to the program's objectives, orientation, and a detailed overview. This session included discussions on the definitions of eating disorders, causes, types, and specifically, an in-depth exploration of Anorexia Nervosa, encompassing its definition, causes, signs, symptoms, complications, and preventive measures. A pretest was also conducted during this session. **The second session** centered on Bulimia Nervosa, covering its definition, causes, symptoms, complications, and prevention. **The final session** delved into Binge Eating Disorder, addressing its definition, symptoms, causes, complications, prevention, and concluding with a post-test.

Evaluation Stage

During the evaluation stage, a posttest was conducted approximately two months after the conclusion of the program to gauge the enhanced knowledge of the students.

Statistical analysis:

The data was processed, coded, and tabulated after it was checked and prepared for computer entry. The computer software SPSS version 22 was used to calculate descriptive statistics such as number and percentage mean scores, and standard deviation. To compare differences in frequency distribution between pre and post study participants, Chi-square, Paired Sample T-test, P-value, and t-value were used. One-way ANOVA tests were employed to examine the relationship between knowledge scores and socio-demographic characteristics. Pearson correlation coefficients (r values) were calculated. Statistical significance was determined based on p-values, with a common threshold of 0.05. In some cases, more stringent significance levels (e.g., $p < 0.01$) were used.

Results

Table (1): Demographic characteristics of the studied Female Students (N=376)

Socio demographic characteristics	No	%
Age group		
from 11-13 years	231	61.4
More than 13 years	145	38.6
Mean±SD(range)	13.3±1.04(11-16)	
Academic year		
First	179	47.6
Second	97	25.8
Third	100	26.6
Place of residence		
Urban	365	97.1
Rural	11	2.9
Father's education		
Illiterate	10	2.7
Reads and writes	45	12.0
Primary	11	2.9
Preparatory	27	7.2
Secondary	141	37.5
University	142	37.8
Mother's education		
Illiterate	24	6.4
Reads and writes	40	10.6
Primary	14	3.7
Preparatory	35	9.3
Secondary	133	35.4
University	130	34.6
Father's occupation		
Government employee	222	59.0
Self-employed	154	41.0
Mother's occupation		
Housewife	247	65.7
Employee	102	34.3

Table (2): Distribution of studied female students based on dietary habits, body weight, and eating disorders Top of Form (N=376) Top of Form

Variables	No	%
Dietary habits		
Vegetarian	90	23.9
Non-vegetarian	286	76.1
Calculate the Body Mass Index		
Length	152.15±12.27(120-195)	
Weight	46.87±10.5(20-93)	
BMI	20.36±4.72(8.11-42.36)	
Body mass index Level		
Under weight	130	34.6
Normal weight	206	54.8
Overweight	26	6.9
Obese	14	3.7
Having eating disorder		
Yes	60	16.3
No	316	83.7

Table (3): Relationship between before and after Educational program related to information about eating disorders for the studied female students (n=60)

Knowledge about eating disorders	Max Score	Pre		Post		X2	P. value
		No	%	No	%		
Poor	<50%	56	93.3	10	16.7	74.65	<0.001
Fair	From 50-60%	3	5.0	5	8.3		
Good	≥60%	1	1.7	45	75.0		
Mean±SD (range)	24	5.63±3.74		17.67±5.45		T= 14.10	<0.001

Chi square test for qualitative data between the two groups

*Significant level at P value < 0.05,

**Significant level at P value < 0.0

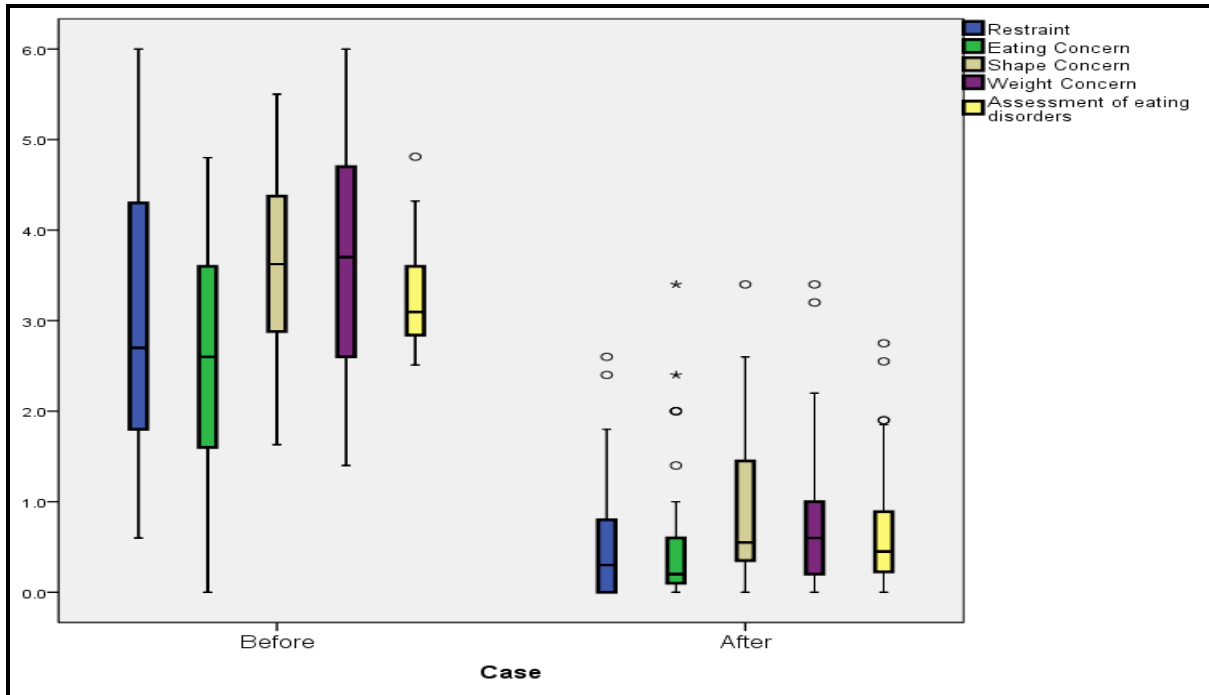


Fig (1): Scatterplots pre and post program related to Eating Disorder Examination-Questionnaire scores the studied female students (60)

Table (4): Correlation Coefficient between Knowledge about eating disorders and Eating Disorder Examination-Questionnaire For the studied female students (N=60)

Correlations	knowledge about eating disorders			
	R	P	R	P
Restraint	0.140	0.286	.298*	0.021
Eating Concern	0.022	0.865	.401**	0.001
Shape Concern	0.155	0.238	0.103	0.435
Weight Concern	0.207	0.112	0.125	0.340
Assessment of eating disorders	-0.037	0.779	-.257*	0.048

*Statistically Significant Correlation at P. value <0.05 **Statistically Significant Correlation at P. value <0.01

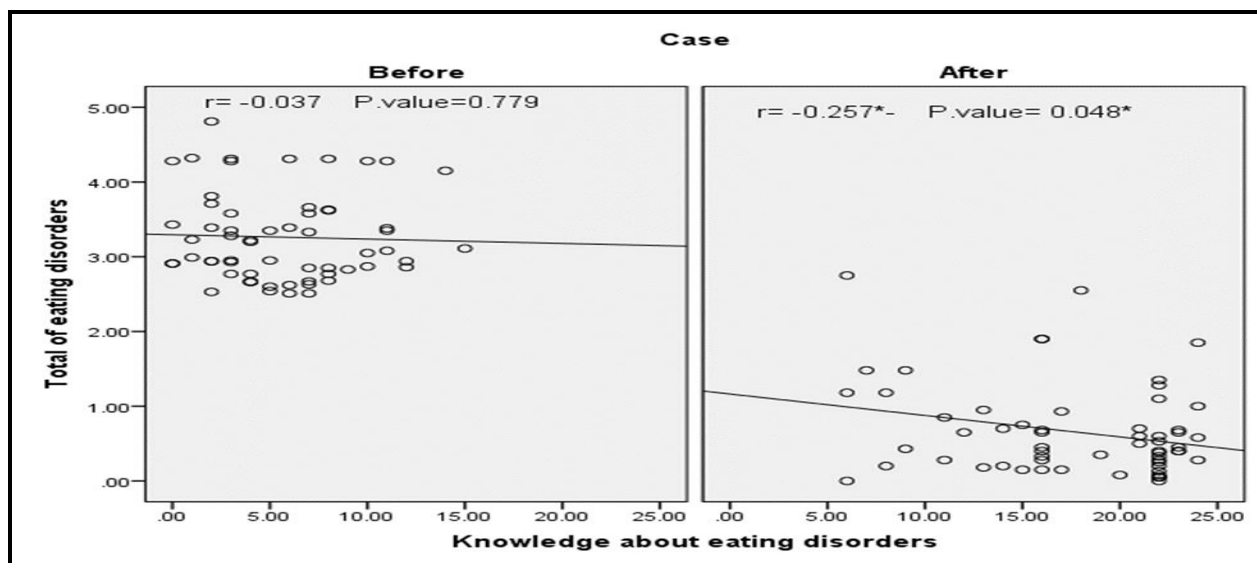


Fig (2): Correlation between knowledge score and eating disorder examination score among studied female students (N=60)

Table (5): Relation between knowledge about eating disorders in pre and posttests and some demographic characteristics among studied female students (N=60)

Demographic characteristics	N	Knowledge about eating disorders			
		Pre		Post	
		Mean±SD	Range	Mean±SD	Range
Age group					
11- 13 year	41	5±3.81	015	18.2±5.16	624
> 13 years	19	7±3.27	014	16.53±6.01	624
Test Used		T=-1.97	P.value= 0.053	T=1.10	P.value= 0.274
Academic year					
First	27	4.07±3.52	012	20.48±3.31	823
Second	24	6.5±3.61	015	14.42±5.23	624
Third	9	8±2.92	312	17.89±6.81	624
Test Used		F=5.54	P.value= 0.006**	F=10.37	P.value= 0.000**
Place of residence					
Urban	56	5.52±3.79	015	17.79±5.3	624
Rural	4	7.25±2.63	511	16±8.12	624
Test Used		T=-0.89	P.value = 0.375	T=0.63	P.value = 0.531
Father's education level					
Illiterate	3	6.67±4.51	211	15±5.29	1121
Reads and writes	4	5.75±4.79	011	17.5±3.87	1423
Primary	2	7±5.66	311	23±0	2323
Preparatory	5	5±2.55	18	19.2±7.46	624
Secondary	20	5.35±3.15	012	18.65±5.22	824
University	26	5.73±4.28	015	16.54±5.54	622
Test Used		F=0.14	P.value= 0.981	F=0.96	P.value= 0.453
Mother's education level					
Illiterate	6	4.5±3.08	19	16.33±6.44	823
Reads and writes	6	6.17±4.4	212	21.67±2.42	1724
Primary	2	8.5±3.54	611	19±2.83	1721
Preparatory	8	7.38±2.2	511	16.88±6.4	622
Secondary	18	5.28±3.08	012	19±4.91	624
University	20	5.15±4.67	015	15.85±5.61	624
Test Used		F=0.80	P.value= 0.552	F=1.50	P.value= 0.207
Father's job					
Government employee	39	5.97±3.94	0-15	17.05±5.73	6-24
Self-employed	21	5±3.33	0-12	18.81±4.82	6-24
Test Used		T=0.96	P.value= 0.340	T=-1.19	P.value= 0.237
Mother's job					
Housewife	41	5.32±3.41	0-12	17.98±5.39	6-24
Employee	19	6.32±4.38	0-15	17±5.67	6-24
Test Used		T=-0.96	P.value= 0.340	T=0.64	P.value= 0.524

- Independent T-test quantitative data between the two groups -

- One-way Anova T-test quantitative data between the three groups or more

*Significant level at P value < 0.05,

**Significant level at P value < 0.01

Table (6): Relation between total of eating disorders and some demographic characteristics among female studied students (N=60)

Descriptive	N	Total of eating disorders			
		Pretest		Posttest	
		Mean±SD	Range	Mean±SD	Range
Age group					
11-13 years	41	3.29±0.57	2.514.81	0.64±0.62	02.75
> 13 years	19	3.19±0.64	2.514.31	0.68±0.59	01.9
Test Used		T= 0.61	P. value= 0.540	T= -0.21	P. value = 0.830
Academic year					
First	27	3.39±0.54	2.624.81	0.46±0.35	01.35
Second	24	3.16±0.59	2.514.31	0.9±0.76	0.052.75
Third	9	3.14±0.7	2.514.31	0.6±0.61	01.85
Test Used		F=1.24	P. value = 0.296	F=3.66	P. value = 0.032*
Place of residence					
Urban	56	3.28±0.6	2.514.81	0.67±0.62	02.75
Rural	4	2.99±0.45	2.543.39	0.47±0.46	01
Test Used		T=0.96	P. value = 0.339	T=0.62	P. value = 0.532

Descriptive	N	Total of eating disorders			
		Pretest		Posttest	
		Mean±SD	Range	Mean±SD	Range
Father's education level					
Illiterate	3	2.85±0.44	2.533.35	0.58±0.35	0.180.85
Reads and writes	4	3.18±0.34	2.683.43	0.47±0.32	0.20.93
Primary	2	3.62±0.94	2.954.28	0.43±0.04	0.40.45
Preparatory	5	3.15±0.42	2.543.63	0.45±0.42	01
Secondary	20	3.07±0.52	2.514.31	0.71±0.64	02.55
University	26	3.46±0.65	2.514.81	0.71±0.7	0.052.75
Test Used		F=1.60	P. value = 0.176	F=0.32	P. value = 0.899
Mother's education level					
Illiterate	6	2.92±0.3	2.533.28	0.59±0.36	0.181.1
Reads and writes	6	3.56±0.48	2.944.28	0.5±0.37	0.131
Primary	2	2.93±0.59	2.513.35	0.43±0.39	0.150.7
Preparatory	8	3.21±0.62	2.514.28	0.35±0.41	01.28
Secondary	18	3.16±0.53	2.64.31	0.79±0.81	02.75
University	20	3.42±0.68	2.634.81	0.75±0.58	0.051.9
Test Used		F=1.29	P. value = 0.283	F=0.82	P. value = 0.541
Father's job					
Government employee	39	3.37±0.61	2.51-4.32	0.67±0.65	0.05-2.75
Self employed	21	3.07±0.5	2.53-4.81	0.63±0.54	0-2.55
Test Used		T =1.89	P. value = 0.063	T =0.28	P. value = 0.777
Mother's job					
Housewife	41	3.17±0.52	2.51-4.32	0.67±0.63	0-2.75
Employee	19	3.45±0.7	2.54-4.81	0.63±0.58	0-1.9
Test Used		T =-1.74	P. value = 0.086	T =0.18	P. value = 0.856

As cleared in **table (1)**, the socio-demographic characteristics of the surveyed female students predominantly comprise younger adolescents aged 11-13 years (61.4%), with a significant majority residing in urban areas (97.1%). Parents' educational backgrounds vary widely, with a notable proportion having university or secondary education (37.5%, 37.8%) respectively, but a small percentage remain illiterate (6.4%). This diversity in parental education and occupation, including a high proportion of government-employed fathers (59.0%) and housewife mothers (65.7%).

Table (2): Showed that the study's sample showcases varied dietary habits, with 76.1% of participants following a non-vegetarian diet and 23.9% adhering to vegetarianism. Participants' body measurements vary, with an average height of 152.15 cm and weight of 46.87 kg, leading to a mean BMI of 20.36. Regarding BMI levels, more than half (54.8%) had a normal weight, but one third are underweight (34.6%), with smaller proportions being overweight (6.9%) or obese (3.7%). Moreover, 16.3 % of them had eating disorders.

Table (3): Illustrates that the predominant proportion of the examined girls initially possessed poor knowledge (93.3%). However, following the program, three-quarters of them (75.0%) exhibited a commendable improvement, transitioning to a state of good knowledge. The mean knowledge score experienced a significant increase from 5.63±3.74

before the intervention to 17.67±5.45 after the intervention ($p < 0.001$).

Figure (1): Showed that the box plot suggests that the case or intervention may have had a positive effect on reducing concerns and behaviors associated with eating disorders, as indicated by the general decrease in median scores and the reduced variability in responses after the case. However, without additional context or statistical analysis, it's not possible to determine the significance or causality of these changes.

Table (4): Revealed that there is a positive correlation between Restraint and Weight Concern and knowledge about eating disorders (r value= 0.140, p - value=0.286) (r value= 0.207, p -value of 0.112) respectively, while the correlations with Eating Concern, Shape Concern, and assessment of eating disorders are not statistically significant (r value= 0.140, p -value of 0.286; r value= 0.155 with a p -value of 0.238; - r value= 0.037 with a p -value of 0.779). Eating Concern is significantly positively correlated with knowledge about eating disorders (r value= 0.401, p -value of 0.001).

In **Figure (2):** It is evident that during the pretest, there existed a weak positive correlation ($r = 0.037$, P value = 0.779) between knowledge scores and eating disorder examination scores. Conversely, post-program, a substantial negative correlation ($r = -0.257$, P value = 0.048) was observed.

Table (5): Showed that the female students aged 11-13 years demonstrated a mean knowledge score of 5 ± 3.81 in the pretest, which increased to 18.2 ± 5.16 in the post-test. Second-year students started with a pretest mean of 6.5 ± 3.61 , dropping to 14.42 ± 5.23 in the post-test with statistically significant differences in pre and posttests. Urban students displayed a pretest mean of 5.52 ± 3.79 , which increased to 17.79 ± 5.3 in the post-test. No significant differences were found among different education levels of fathers and mothers in both pre and post-test knowledge scores.

Table (6): Revealed that the students aged 11-13 years had a mean pretest score of 3.29 ± 0.57 , increasing to 0.64 ± 0.62 in the posttest with no statistically significant differences were observed between age groups in both pre and posttests (P. value= 0.540, P. value = 0.830) respectively. While there was no significant difference in the pretest, a significant difference was observed in the posttest among academic years (P. value = 0.296, P. value = 0.032) respectively.

Discussion

Eating disorders are a major public health issue faced by female students. Anorexia nervosa, bulimia nervosa, and binge eating often have a variety of irreversible and life-threatening medical complications (Essa et al., 2020). The aim of this study was to evaluate the effect of the educational program regarding eating disorders among adolescent girls

The current study revealed that the mean age of the students was 13.3 ± 1.04 , ranging from 11 to 13 years. These findings contrast with those of Essa et al., 2020, who investigated eating disorders among Female University Students and reported a mean age of 19.725 ± 1.318 among the university students.

The disparity in mean age between the two studies may be attributed to differences in the study populations, as one focuses on female university students, while the present study targets a younger age group.

The present study on the body mass index (BMI) of the female students indicates that over half of them had a normal weight. In contrast, slightly over one-third of the studied students were underweight, and only less than four percent were classified as obese. These findings differ from those reported by Chaikali et al., 2023, who observed that approximately two-thirds of their studied students fell within the normal weight range, with more than two-fifths classified as overweight.

The variation in BMI distribution between the two studies could stem from several factors, including differences in the characteristics of the study

populations, geographical locations, and cultural influences.

In the current study, it was identified that less than one-fifth of the studied students are suffering from eating disorders. This prevalence rate underscores the urgency of addressing this issue, as it highlights the potential complications associated with eating disorders. Similar findings were reported by Leal et al., 2020 & Dahlgren et al., 2023, where both studies also observed that less than one-fifth of the participants were affected by eating disorders.

On the contrary, Sabry et al., 2020 & Albrahim et al., 2022 & Albrahim et al. (2022), reported higher prevalence rates. Sabry et al. found that 9.3% of adolescents had eating disorders, while Albrahim et al., 2022 observed that more than two-quarters of their studied sample were affected. Additionally, Albrahim et al., 2022 reported a prevalence rate of eating disorders exceeding one-quarter among their study participants.

These variations in prevalence rates among different studies could be attributed to differences in sample characteristics, methodologies, cultural factors, or the specific criteria used to define and diagnose eating disorders.

The current study illustrated that the majority of the examined girls initially possessed poor knowledge. However, following the program, three-quarters of them exhibited a commendable improvement, transitioning to a state of good knowledge which supported the alternative study hypothesis. The mean knowledge score experienced a significant increase from 5.63 ± 3.74 before the intervention to 17.67 ± 5.45 after the intervention ($p < 0.001$).

The reported findings are consistent with Kumar, 2020 who revealed that in the pre-test, over one-third of the adolescent girls had poor knowledge scores, and none of them had a good knowledge score regarding eating disorders. In the post-test, a majority of the adolescent girls showed average knowledge scores, while less than one-fifth exhibited good knowledge scores.

Similarly, other studies conducted by Datta et al., 2018, Sharma., 2019, and Singh & Randhawa ., 2021 also affirmed that participants initially had poor knowledge before the educational program. However, after the implementation of the program, their knowledge improved.

These results collectively indicate that structured teaching programs effectively enhance knowledge about eating disorders among adolescent girls. Also, it may be explained by lack of proper health education programs in the school, which focused on the dietary health and practice among girls.

In the other side, this result contradicted with Smith & Keel, 2017 who showed that educational

interventions did not significantly improve knowledge about eating disorders among a similar demographic. It could be considered in contrast to the present study which might be attributed to differences in intervention methodologies, study populations, or cultural contexts.

The present study in agreement with **Czeczor et al., 2016** who conducted a study about Students' awareness of and attitudes towards eating disorders: preliminary study. They confirmed that there were positive correlations between eating disorders and student's knowledge.

The present study revealed that there is a significant positive correlation between Restraint and Weight Concern (r value= 0.207, p -value of 0.112), while the correlations with Eating Concern, Shape Concern, and Assessment of eating disorders are not statistically significant (r value= 0.140, p -value of 0.286; r value= 0.155 with a p -value of 0.238; - r value= 0.037 with a p -value of 0.779). Eating Concern is significantly positively correlated with Weight Concern (r value= 0.401, p -value of 0.001).

This result agreed with **Lawless et al., 2021** who revealed that individuals who report higher levels of dietary restraint are more prone to overeating, and thus are at a higher risk for weight gain.

The recent findings emphasized the absence of a significant correlation between demographic data and students' knowledge. This observation aligns with the outcomes of **Sharma, 2019** and **Singh & Randhawa, 2021**, who similarly discovered no significant relationship between demographic factors and students' knowledge.

Moreover, these results are consistent with the findings of **Kumar, 2020**, who identified no significant association between the increase in knowledge regarding eating disorders and demographic variables such as age and residential area. Similarly, the outcomes are in harmony with **Bizri et al., 2020 & Sabry et al., 2020**, wherein they reported no statistically significant difference in total eating disorders concerning age.

The lack of a significant relationship between demographic variables and knowledge implies that the educational program implemented in the study had a uniform impact across different demographic groups. It suggests that the effectiveness of the intervention in enhancing knowledge about eating disorders was not contingent upon factors like age or residential location.

The present study evident that during the pretest, there existed a weak positive correlation ($r = 0.037$, P value = 0.779) between knowledge scores and eating disorder examination scores. Conversely, post-program, a substantial negative correlation ($r = -0.257$, P value = 0.048) was observed.

This result is agreed with **Jones et al., 2018 & Forrest et al., 2019** who observed a weak positive correlation during the pretest and post-intervention, they found a notable negative correlation. While, this result disagreed with **Chen et al., 2022 & Williams et al., 2017** who found a continued weak positive correlation between knowledge scores and eating disorder examination scores after their intervention. The discrepancies may arise from variations in content and structure of the educational programs, study populations, and methodologies employed in each research study.

The present study had many strengths, it includes a diverse sample of female students, considering factors such as dietary habits, body measurements, and socio-demographic characteristics. This diversity enhances the generalizability of the findings. While there were weakness points, the study design may limit the ability to establish a causal relationship. Some data, such as dietary habits and potentially knowledge scores, may rely on self-reporting, introducing the possibility of bias or inaccuracies.

Practical Implications:

The success of the educational program suggests that similar interventions could be valuable in improving knowledge about eating disorders among adolescent girls. Findings related to dietary habits, BMI, and eating disorders prevalence can inform public health initiatives targeting this population, helping to tailor interventions based on identified needs. Healthcare professionals can use the study's results to inform their approaches to educating and supporting adolescent girls in managing and preventing eating disorders.

Conclusion

In summary, the study highlighted diverse dietary habits among the participants, with a significant impact observed following the program intervention. The findings indicate an improvement in knowledge scores and a positive effect on reducing concerns and behaviors associated with eating disorders. Moreover, the correlations revealed important insights regarding the students' age groups and academic years. These results emphasize the importance of targeted interventions and education in addressing eating disorders.

Recommendations

1. Develop and implement targeted educational programs that consider the diverse dietary habits and body measurements of the population.
2. Establish ongoing monitoring mechanisms to assess the sustainability of knowledge improvement and changes in concerns and behaviors related to eating disorders over time.

3. Conduct longitudinal studies to track changes in nutritional knowledge, concerns, and eating behaviors over an extended period.
4. Further studies on larger sample size among different groups and settings are needed for generalization of the study.

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