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Enhancing Knowledge and Reducing Fatigue in Heavy Menstrual Bleeding: The Role of Web-Based Learning Guidelines

Wesam Mohammed Ibraheem Abo-Eleneen[1], Hend Salah Eldin Mohamed [2], Naeima Mohamed Elsaid Ahmed[3], Eman Ahmed Gouda Ahmed[4]

[1)] M. Sc. , Faculty of Nursing, Zagazig University, [(2)] Professor of Obstetrics and Gynecology Nursing- Faculty of Nursing – Zagazig University, [(3&4)] Assistant Professors of Obstetrics and Gynecology Nursing- Faculty of Nursing – Zagazig University

ABSTRACT

Background*:** Heavy menstrual bleeding is excessive menstrual blood loss (MBL) that interferes with a woman's physical, emotional, social, and material quality of life (QOL). ***Aim of the study: Was to evaluate the effect of web-based learning guidelines on fatigue among women with heavy menstrual bleeding. ***Study design:*** Quazi experimental design. ***Setting:*** The study was conducted in outpatient gynecology clinic at Kafr Sakr city general hospital at Sharkia governorate. **Study subjects:** A purposive sample of 110 women was included in the study. ***Tools of data collection:*** four tools were used; structured interviewing questionnaire, Modified assessment scale for heavy menstrual bleeding features among women, Women Knowledge Regarding Heavy Menstrual Bleeding, and Brief Fatigue Inventory. ***Results:*** There were statistically significant differences of women knowledge regarding normal menstruation and heavy menstrual bleeding throughout the intervention ($p<0.05$) and highly statistically significant differences between pre and post intervention regarding level of fatigue severity, fatigue impact and total fatigue level. Women total fatigue level decreased after intervention. ***Conclusion:*** Highly statistically significant differences were found regarding total score of women knowledge and, fatigue among women with heavy menstrual bleeding throughout study phases. ***Recommendations:*** Web based learning guidelines should be part of management plan of all women with heavy menstrual bleeding in all settings and health education should include fatigue management strategies as fatigue is the most common symptom of heavy menstrual bleeding associated anemia..

Keywords: Web-Based Learning Guidelines, Heavy menstrual bleeding & Fatigue.

INTRODUCTION

Normally menarche starts between the ages of 10 to 16, and menstrual cycle continues regularly if not interfered with by pregnancy or use of hormonal contraceptives until the menopause, at an average age of 51,. The normal menstrual cycle is characterized by fluctuations in reproductive hormones: follicle-stimulating hormone (FSH), luteinizing hormone (LH). estrogen, and progesterone. Heavy menstruation or menorrhagia can cause an iron deficiency anemia which manifests mainly with fatigue, weakness, dizziness, and shortness of breath **(Hayward et al., 2024).**

Heavy menstrual bleeding can be defined as excessive menstrual blood loss that interferes with a woman's physical, social, emotional, or material quality of life **(Hall et al., 2024)**, that may be related to many causes including hormonal imbalance, anovulation, thyroid disease, polycystic Ovary Syndrome (PCOS), weight gain or weight loss, benign or malignant growth in the uterus, Infection, pregnancy complications and etc. **(Dutton& Kai., 2023).**

Symptoms of heavy menstrual bleeding may include: Soaking of one or more sanitary pads or tampons every hour for several hours, needing double sanitary protection to control menstrual flow, and getting up at night to change sanitary pads or tampons. bleeding for more than a week, passing large blood clots, limiting daily activities due to heavy menstrual flow, feeling tired, fatigued or short of breath as the result of blood loss. Symptoms include also headaches and feeling tired. The condition of heavy menstrual bleeding may be accompanied by painful menstrual cramps which known as dysmenorrhea **(Kennedy et al., 2022).**

The average prevalence of heavy menstrual bleeding across low-income and middle-income countries in southern Asia and sub-Saharan Africa is 48·6% ***(Sinharoy et al., 2023).*** In Egypt 16% of women aged 15 to 44years were diagnosed with menorrhagia, and 25% of the women complained about long-frequent periods of bleeding or spotting ***(Saad et al., 2023)***.

Feeling fatigued and tired due to heavy menstrual bleeding is a common symptom. Generally, fatigue happens due to direct impact of excessive physical activity, lack of sleep, unhealthy eating habits, or a side effect of some medications. Although most of these causes can be controlled and avoided unless it is caused by an underlying health issue. Many women suffer from menorrhagia, which is more

commonly known as heavy periods **(Billones et al., 2021)**

Web-based learning guidelines focus on educating individuals through online platforms, offering information, resources, and strategies to manage health problems. Regarding HMB, web-based learning guidelines could focus on: understanding HMB and its effects on health: Educating women about the causes, symptoms, and treatments for HMB and dietary changes. Teaching women also how to manage their condition, such as lifestyle modifications, monitoring blood loss, and understanding when medical intervention is needed, stress management and coping techniques: Addressing emotional and psychological factors that can contribute to or worsen fatigue, such as stress, anxiety, and depression. By increasing awareness and providing web-based learning guidelines can help individuals make informed choices and take proactive steps to improve their health outcomes **(Hu et al., 2022)**

Nurses play an important role to promote the use of mobile apps for patients to monitor their menstrual cycles as part of delivering holistic care. Mobile apps can help educate patients so they can monitor their health while keeping their private health information safe **(Sanchez & Maresh., 2021).**

Significance of the study:

Heavy menstrual bleeding is common, affecting about 27% to 54% of all menstruating women **(Dutton& Kai., 2023)** and about 11–13% of women in the childbearing period suffer from heavy menstrual bleeding or menorrhagia **(Farahat, et al, 2020).** Excessive blood loss cause symptoms as cramping, pelvic pain, fatigue and anemia which significantly affect quality of life, that negatively affect usual activities or even stay home **(Su, et al, 2020)**. It is estimated that 42.9% of women aged <36 years and 66.3% of women aged >36 years suffer from fatigue **(Świątczak et al., 2022).** Exercise, energy conservation, sleep and hygiene, psychological and support, dietary management pharmacological management, patient education and follow up are the most important measures to alleviate fatigue after exclusion of underlying pathology **(Buduhan et al., 2018).** Web-based learning in medical education includes overcoming barriers of distance and time, economies of scale, that is modern educational method **(Kasirye, et al, 2023).** To date there have been limited studies about web-based learning regarding fatigue among women with heavy menstrual bleeding. So, this study was conducted to evaluate the effect of web-based learning guidelines on fatigue among women with heavy menstrual bleeding.

Aim of the study:

The present study aimed to evaluate the effect of web based learning guidelines on fatigue among women with heavy menstrual bleeding.

Research hypothesis:

A significant improvement in degree of fatigue will be noticed among women with heavy menstrual bleeding who had received web-based learning guidelines.

Subjects and Methods:

Research design:

Quazi experimental design (pre & posttest) was used to investigate the effect of web-based learning guidelines on fatigue among women with heavy menstrual bleeding.

Study Setting:

The study was conducted in outpatient gynecology clinic at Kafr Sakr city general hospital at Sharkia governorate. The location of this clinic in the first floor in outpatient department. This unit was beside the family planning clinic and consist of two rooms, first one for history taking from the mother and second one well equipped for physical examination of the patient. It is opened daily from 8 am to 2 pm except Friday.

Study Subjects and sampling:

A purposive sample of 110 women with heavy menstrual bleeding was used in recruiting study according to the eligibility criteria in the above-mentioned setting

Inclusion criteria:

- Educated women in the age group of 18-49 years.
- Have smart phone connect to the internet and accept to participate in the study.
- Have regular menstrual periods and free from any organic lesion except small fibroids that will not require surgical management.
- Women diagnosed by physician as a case of heavy menstrual bleeding.

Sample size calculation:

The estimated sample was 110 women. The sample size was calculated by using software Epi Info package version 6-04.

Tools for data collection:

Four tools were used to collect the necessary data:

Tool I: A structured interviewing Schedule.

This questionnaire was designed by the researcher in simple Arabic language to collect the necessary data for achieving the study objectives after reviewing the related literature **(Kocaoz et al., 2019) and (Eswi et al., 2012)** and was composed of two parts:

Section 1: Socio-demographic characteristics

For collecting data pertaining demographic characteristics of the studied women, it composed of 5 questions as age, level of education, residence, occupation & family income level

Section 2: Menstrual characteristics

The second part was concerned with Menstrual characteristics of study subjects it included questions about age at menarche, duration of menstruation, menstrual cycle Interval, the number of days of heavy menstruation, large clot passage during menstruation, number of pads used in one cycle, use of double pads during menstruation, frequent replacement of pads for heavy menstruation

Tool II: Modified assessment scale for heavy menstrual bleeding features among women

This scale adapted from **(Gokyildiz, et al, 2013)** and modified by the researcher in a simple Arabic language. It was used to collect the necessary data about the menstruation characteristics of women

with heavy menstrual bleeding It includes 6 items that measures severity of heavy menstrual bleeding. It included questions about intermittent bleeding, how long have the subject had heavy menstrual bleeding, severity of menstrual bleeding as perceived by women and also asking the woman about some situations that she may had experienced such as getting dirty on the under wears, getting dirty on the clothes, getting dirty on the bed linens, getting dirty on the furniture. Then, presence of dysmenorrhea if yes what is the level mild, moderate or severe as perceived by woman. And if the woman knows any woman (mother, sister, or other) in her family has or has had HMB.

Tool III: Women Knowledge Regarding Heavy Menstrual Bleeding

It was developed by the researcher in a simple Arabic language guided by available literature consist of closed ended and multiple-choice questions, **(Eswi, et al, 2012) (Balaji, et al, 2022)** to collect necessary data for assessing the women knowledge about normal menstrual cycle as; definition, age of menarche, normal interval between menstrual cycles, normal duration of menstruation, associated symptoms with menstruation & information source regarding menstruation. Also included questions about heavy menstrual bleeding such as definition, causes, diagnosis, complication and management.

Scoring system of women knowledge:

The total score was ranged from 0-24 grades for all knowledge items and was assigned: a score (1) was given when the answer was correct and a score (0) was given when the answer was incorrect or don't know.

Total knowledge regarding heavy menstrual bleeding based on the statistical analysis was calculated as:

Satisfactory knowledge > 60% of total scores

Unsatisfactory knowledge < 60% of total scores

Tool IV The BFI Brief Fatigue Inventory

This scale used for evaluation of the general fatigue level and the level of interference with daily activities within the past 24 hours and adapted from **(Kocaoz, et al, 2019)** and modified by the researcher. It includes 9 items that measures fatigue severity and interference with life for the past 24 hours. The scale included the general fatigue level and the level of interference with daily activities within the past 24 hours..

Scoring system of fatigue level

On an 11 point scale and can range from 0 to 10 the total score for BFI can be obtained by averaging all 9 items. A score of "0" from the BFI shows that fatigue does not affect the individual, "1-3" a low level, "4-6" a moderate level, "7-9" a high level, and "10" the highest level .

Supportive material

An educational nursing guidelines booklet for women with heavy menstrual bleeding. It was developed by the researcher from the recent related literature in simple Arabic language. The content of the educational booklet included information about normal menstrual cycle and heavy menstrual bleeding such as definition, prevalence, causes, diagnosis and management of heavy menstrual bleeding. It also included information about anemia such as definition, prevalence, causes, diagnosis, management and dietary guidelines for anemia. Finally, it included information about fatigue such as definition, fatigue management strategies and some general guidelines for more healthy life as healthy balanced dietary habits, adequate sleeping hours, regular exercises, massage, and vitamin and mineral supplements.

Content Validity:

The tools were tested for content validity by jury of three experts, two professors of obstetrics and gynecological nursing department and one professor of community health nursing department faculty of nursing. These experts assessed the tools for clarity, relevance comprehensive, understanding, applicability, and easiness for administration. No modifications were required. Additionally, the researcher prepared a guide booklet for the studied subjects which covered all items related to normal menstrual cycle, heavy menstrual bleeding and fatigue in view of recent literature. The same experts who validated the tools also revised and validated the guide booklet. All recommended modifications were done.

Content Reliability:

The reliability of the items of the tools were assessed using cronbach,s alpha test, its result was 0.704 for women knowledge about heavy menstrual bleeding and 0.93 for fatigue which indicate an accepted reliability of tools.

Pilot study was done 10% to estimate reliability of study tools

Variables		
	Cronbach's Alpha	N of Items
Knowledge Questionnaire	0.704	21
Fatigue Questionnaire	0.93	9

Field work:

The data collection was done first using the interview questionnaire sheet after identifying the women who fulfilled the criteria of the study, they were requested to participate in the study. The researcher explained the aim of the study briefly to the woman and the method to contact them and their agreement to participate was obtained. The activity took place in the previously mentioned setting in the waiting area of the outpatient clinic.

The questionnaire tools were filled by the researcher by asking the woman and the average time spent with each participant to be interviewed was 30-45 minutes. The study was for a period of five months, during the period from the beginning of October 2023 to the end of February 2024. Educational sessions were developed based on actual educational need assessment of studied subjects, to improve their knowledge fatigue level. It was developed by the researcher in the light of available research and literature. It was written in simple Arabic language to cover the relevant theoretical and practical aspects of heavy menstrual bleeding and fatigue management.

To fulfill the aim of the study, the following phases were adopted and carried out through: assessment phase, planning phase, implementation phase and evaluation phase.

Assessment phase:

This was the first phase that was achieved after taking the verbal agreement from the study participant in the study setting where knowledge needs and fatigue level were identified (pre-test) through collection and analysis of the baseline data from the filled tools. After complete physical examination and history taking by physician, diagnosis is confirmed by physician as heavy menstrual bleeding.

Thus the development of the program was partially based on woman knowledge, and fatigue level.

Planning phase:

Based on the result obtained from assessment phase, the researcher designed the intervention program and sessions content according to the identified woman needs and in view of related literature. Identified needs requirements and deficiencies in knowledge. Furthermore, the researcher prepared an educational booklet to help them follow the educational sessions and to serve as reference at home, it was sent online to them.

Description of the program (educational nursing guidelines)

The first step in developing this program was to determine the main aim and objectives. These objectives were derived from the assessed needs of the study subjects. These were categorized into specific objectives and tasks were ordered in sequential order consistent with teaching and learning process. The program was set in five sessions covering two sections of the educational booklet. The first is knowledge about heavy menstrual bleeding, the second is about fatigue.

General objective of the educational program:

The educational program aimed to improve women level of knowledge about heavy menstrual bleeding and fatigue.

Specific objectives of the program:

At the end of the educational sessions, women should be able to:

Identify normal characteristics of menstrual cycle, define heavy menstrual bleeding, list causes of heavy menstrual bleeding, mention symptoms of heavy menstrual bleeding, explain diagnostic test for heavy menstrual bleeding, acquire knowledge about management if heavy menstrual bleeding, define fatigue, Identify prevalence of fatigue, acquire knowledge about fatigue management strategies.

The sessions were as follows:

Session1: Initial session was carried out for each individual woman in the waiting area in the clinic while waiting for lab result that usually available after 12 pm so it was good chance for the researcher to introduce self to the woman, take consent, orient the woman about the problem using the educational booklet that contain photos and diagram for better understanding and illustration through brief orientation of the contents of the educational booklet to encourage the woman to attend subsequent sessions on what's app, messenger and Google meeting application.

Session II: Focus on background and overview about normal menstrual cycle characteristics. Google meet sessions were used to illustrate the contents of the session. The educational booklet was especially prepared to facilitate understanding of the content.

Session III: This session is focusing on heavy menstrual bleeding background which includes definition, prevalence, causes, symptoms, diagnostic tests and management of heavy menstrual bleeding. Video call by messenger used as teaching method as well as Google meet. In addition to what's app chatting to answer any question.

Session IV: Aimed to help the studied subjects to identify fatigue definition and prevalence and to master fatigue management strategies. Google meeting session was used as teaching method. Booklet pictures were the media used.

Session V: Last session include revision and reinforcing information given across previous sessions.

c- Implementation phase:

A group on what's app was established by the researcher with all sample women and the researcher started the program session daily for one week to cover all the content of the educational program. The contents based on a supportive booklet and photos prepared by the researcher based on literature review and available sources regarding fatigue management strategies and life style modification guidelines.

Sessions on Google meet that were carried by the researcher using what's app chatting and voices through a group made by the researcher to allow interaction between researcher and the women that illustrate the educational contents of the program using screen shots of photos and diagrams from the booklet with each point illustrated. At the end of each session women were allowed to ask questions either on what's app in public group or on the personal account of the researcher on what's app or on phone call where the researcher call the women every week to ensure good adherence to fatigue management strategies and to remind women with date of follow up and post-test. Before termination of each session and telephone call feedback was obtained from the women to ensure understanding of the content. The total frequency of web-based learning session were 5 sessions excluding face to face initial session each session last about 30-45 minutes and each telephone call last about 10-15 minutes.

Additionally, every woman received on basic conversation every week. The day and time of were determined according to available time for each woman separately. The content was based on the supportive booklet

d- Evaluation phase

In order to evaluate the effect of web-based learning guidelines, the posttest was administered immediately after implementation of the entire web based learning guidelines sessions at gynecological clinic where the women were reassessed by the physician. The same tools used in pre-test were used in post-test.

Limitation of the study

- The participants must pay for internet access.
- Sometimes bad internet connection during sessions.

D. Ethical consideration:

Ethical approval was obtained from the scientific and ethics committee of the Faculty of Nursing at Zagazig University. The aim of the study was explained to each woman before applying the tools to gain her confidence and trust. A verbal agreement for participation was obtained from each woman who agrees to participate in the study after ensuring that data collected will be treated confidentially. Women were informed that they have the right to withdraw from the study at any time without giving any reason.

Administrative design

An official permission was obtained from the Dean of the faculty of Nursing at Zagazig University and from Managers of previously mentioned setting to carry out the study.

Statistical design:

All data were collected, tabulated and statistically analyzed using SPSS 20.0 for windows (Statistical Package for Social Sciences). Quantitative data was represented as mean $\pm$ SD, median (range) and qualitative data were represented as absolute frequencies (number) and relative frequencies (percentage). Mc nemar test or marginal homogenety was used to compare between two dependent groups of categorical data. Percent of categorical variables were compared using Chi-square test. Multiple linear regression (stepwise) was also used to predict factors which affect total knowledge scores. Cronbach alpha coefficient was calculated to assess the reliability of the scale through its internal consistency. P-value <0.05 was considered to be statistically significant. P-value <0.01 was considered to be highly statistically significant, and P-value >0.05 was considered to be statistically non-significant (NS)

Results:

Table 1 displays that 51.8% of studied women their age was ≥35 years and the mean of age was 34.6±7.5 years, as regards to the educational level it was obvious that 61.8% of studied women have secondary school. The same table reveals that 66.4% of them resided in urban areas. Moreover; 54.5% of them were housewives and 82.7% has sufficient family income level.

Table 2 shows that 70% of the studied women started menstruation at the age of 12-14 year. It also showed that 45.5% of studied women have menstruation ≥8 days and menstrual cycle interval of 60% of them was 21-35 days. In same direction, it was found that 67.3% of studied women suffered from large clot passage during menstruation, that's why 65.5% of them use ≥12 pads every cycle. Moreover; 46.4% have double pads and 63.6% of them frequently replace pads due to heavy menstruation.

Table 3 reveals that 40.9% of studied women have intermittent bleeding and duration of HMB was 3 months and less for 41.8% of the studied women and 50.9% of studied women described their cycle as heavy and 53.6% of them get dirty on the under wears during HMB; Moreover 48.2% of studied women have getting dirty on the cloths and also revealed that 30% of them Getting dirty on the bed linens during HMB. Finally it was found that (30.9%) have family history of HMB.

Table 4 clarifies percentage of satisfactory knowledge about normal menstrual cycle, heavy menstrual bleeding and anemia increased to after implementation of the web based learning guidelines. The difference was highly statistically significant p value was .0001.

Figure I illustrates that only16.4% of the studied women had satisfactory level of knowledge regarding heavy menstrual bleeding pre intervention which improved to 80.9% post intervention.

Figure II shows distribution of studied women regarding their degree of fatigue through the Intervention Phases right now. It clarifies that 41.8% of studied women had severe fatigue pre intervention but post intervention 7.3% of them had severe fatigue.

Table 5 report that there were highly statistically significant differences between pre and post intervention regarding level of fatigue severity, fatigue impact and total fatigue level p>0.01. Women total fatigue level decreased after intervention.

Table 6 reflects that there was no statistically significant relationship between women fatigue level, age, income medical problems education, residence occupation and surgical history (p>0.05)in post intervention phase.

Table 7 reflects direct correlation coefficient between fatigue score and hemoglobin value among women with HMB throughout study phases ($r^=$ -0.464) with statistically significant p (0.0001) pre intervention and ($r^=$ -0.330) with statistically significant p (0.0001) post intervention. It reflects also direct significant correlation between knowledge score and hemoglobin value in post intervention phase of program p<0.05.

Table 8 As noticed from the table the independent positive significant predictor of post intervention fatigue score were post total knowledge score p<0.05. The model explains 31% of variation in total fatigue score post intervention (R2=0.31)

Table (1): Distribution of Demographic characteristics of the Studied Women with Heavy Menstrual Bleeding (n=110):

Variables	No.	%
Age group		
• 18 - ≤ 34 years	53	48.2
• ≥35 years	57	51.8
• Mean± SD	34.6±7.5	
• Median(range)	35(18-47)	
Education		
• Secondary school	68	61.8
• University	42	38.2
Residence		
• Urban	73	66.4
• Rural	37	33.6
Occupation		
• Working	50	45.5
• Housewife	60	54.5
Family Income Level		
• In sufficient	6	5.5
• Sufficient	91	82.7
• Sufficient and save	13	11.8

Table (2): Distribution of the Studied Women with Heavy Menstrual Bleeding According to their Menstrual characteristics (n=110):

Variables	No.	%
Age at menarche\years		
• ≤11	4	3.6
• 12-14 years	77	70.0
• ≥ 15 years	29	26.4
Duration of menstruation\days		
• ≤ 4 days	13	11.8
• 5-7 days	47	42.7
• ≥8 days	50	45.5
Menstrual cycle Interval\days		
• <21 days	42	38.2
• 21-35 days	66	60.0
• >35 days	2	1.8
The number of days of heavy menstruation		
• 1-3 days	61	55.6
• ≥ 4 days	49	44.5
Large clot passage during menstruation		
• Yes	74	67.3
• No	36	32.7
Number of pads used in one cycle		
• ≤11 pads	38	34.5
• ≥12 pads	72	65.5
Double pads		
• Yes	51	46.4
• No	59	53.6
Frequent replacement of pads for heavy menstruation\day		
• Yes	70	63.6
• No	40	36.4

Table (3): Distribution of the Studied Women with Heavy Menstrual Bleeding According to their Heavy Menstrual Bleeding Features (n=110):

Feature items	No.	%
Intermittent Bleeding		
• Yes	45	40.9
• No	65	59.1
Duration of HMB		
• 3 months and less	46	41.8
• 4–11 months	29	26.4
• 1-2 years	27	24.5
• >2 years	8	7.3
Severity of menstrual bleeding		
• Moderate	40	36.4
• Heavy	56	50.9
• Very heavy	14	12.7
Getting dirty on the under wears	82	74.5
• Before HMB	4	3.6
• During HMB	59	53.6
• Before and during HMB	19	17.3
Getting dirty on the cloths	68	61.8
• During HMB	53	48.2
• Before and During HMB	15	13.6
Getting dirty on the bed linens	46	41.8
• During HMB	33	30.0
• Before and during HMB	13	11.8
Getting dirty on the furniture	29	27.3
• During HMB	19	17.3
• Before and during HMB	11	10.0
Family history of HMB		
• Yes	34	30.9
• No	76	69.1

Table (4): Distribution of Studied Women Regarding Their Knowledge about Normal Menstrual Cycle, Heavy Cycles (n=110):

		Women' knowledge level				χ^2	M p-value
		Pre intervention		Post intervention			
		No.	%	No.	%		
Know about normal menstrual cycle	Satisfactory	56	50.9	105	95.5	13.789	
	unsatisfactory	54	49.1	5	4.5		0.0001**
	Mean ± SD	3.23±0.94		4.85±0.47			
Know about heavy menstrual bleeding	satisfactory	7	6.4	87	79.1	12.337	
	unsatisfactory	103	93.6	23	20.9		0.0001
	Mean ± SD	1.44±0.88		4.34±1.39			

Mcnemar test * P value significant at P<0.05, ** P value highly significant <0.05

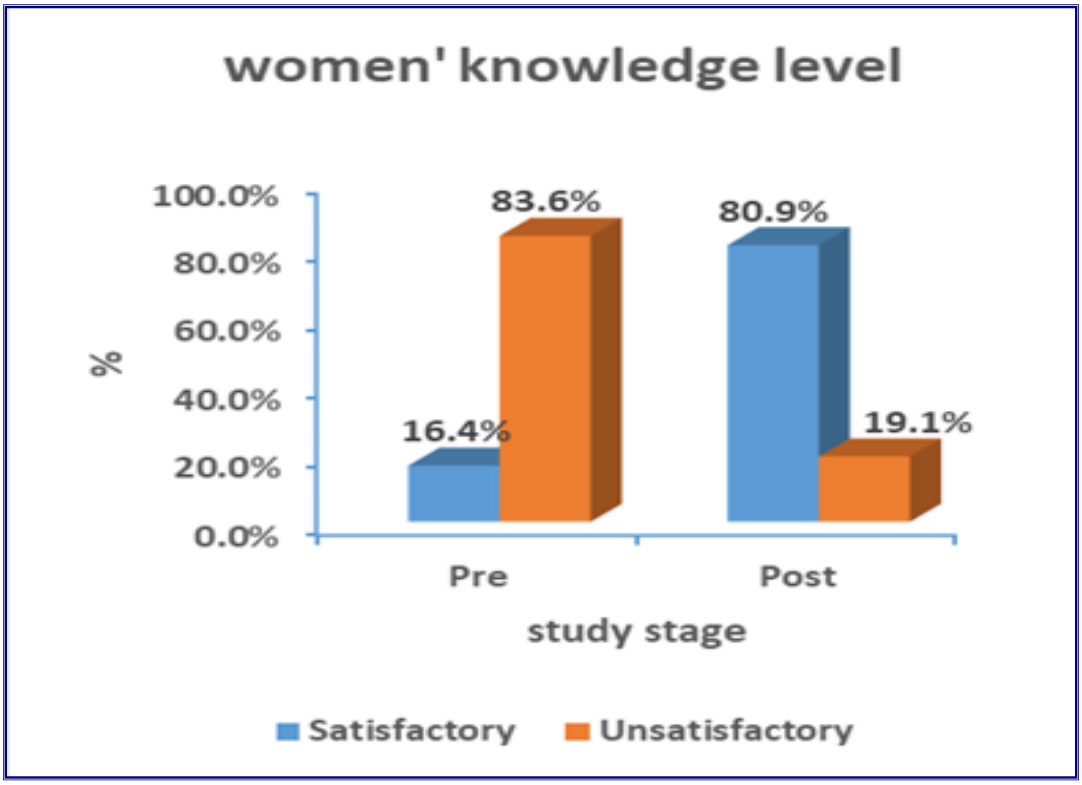

Fig. (I): Total Women Knowledge Score through the Intervention Phases (n=110)

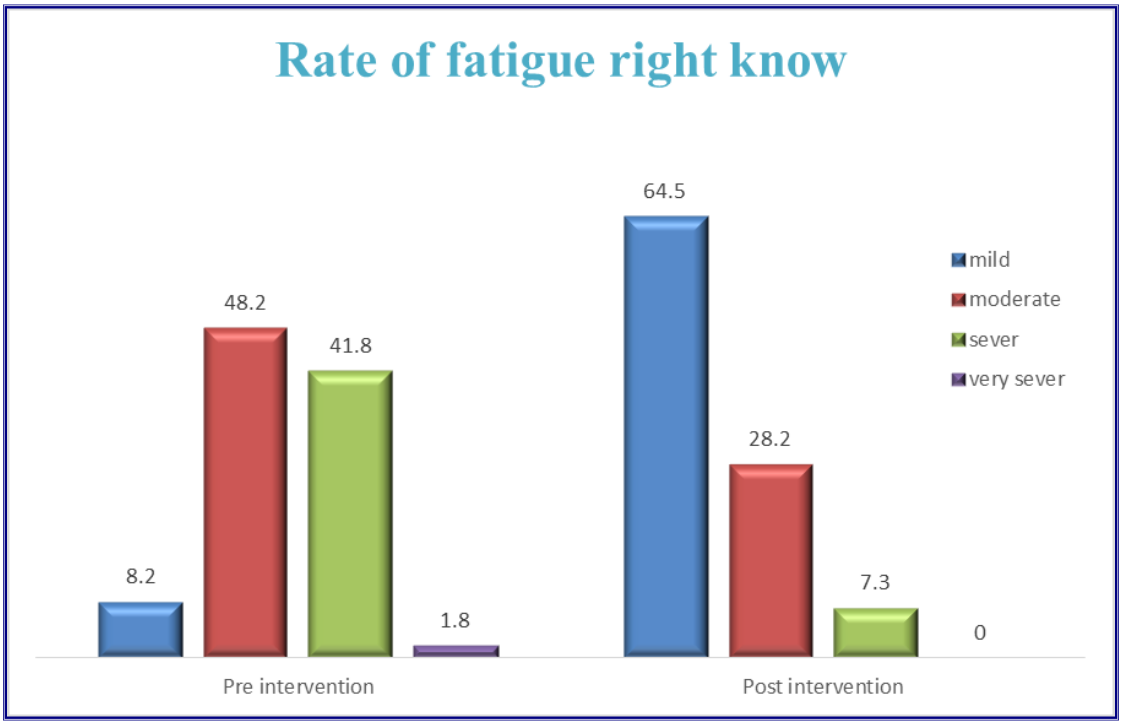

Fig. (II): Distribution of Studied Women Regarding Their degree of fatigue Right Now through the Intervention Phases (n=110).

Table (5): Distribution of Studied Women Regarding Their degree of fatigue Severity and Fatigue Impact Score throughhe Intervention Phases (n=110):

		Participants' fatigue				χ^2	p-value
		Pre intervention		Post intervention			
		No.	%	No.	%		
Fatigue Severity	Mild fatigue	9	8.2	65	59.1		
	Moderate fatigue	34	30.9	28	25.5	98.517	**0.0001
	Severe fatigue	67	60.9	17	15.5		
	Mean ± SD	19.17±5.64		10.87±6.37			
Fatigue impact	Mild fatigue	6	5.5	77	70.0	115.157	**0.0001
	Moderate fatigue	41	37.3	24	21.8		
	Severe fatigue	63	57.3	9	8.2		
	Mean ± SD	37.15±10.04		19.53±11.34			
Total fatigue Level	Mild fatigue	6	5.5	60	54.5		
	Moderate fatigue	37	33.6	42	38.2		
	Severe fatigue	67	60.9	8	7.3	135.147	**0.0001
	Mean ± SD	56.30±15.32		28.98±16.54			

Marginal homogeneity test *p<0.05 statistically significant **p>0.01highly statistically insignificant

Table (6): Relation between Women Fatigue Level and their Demographic & Medical History in Post Intervention Phase (n= 110):

Variables	Fatigue level among women post intervention						n.	χ^2	p
	mild fatigue n.60		moderate fatigue n42		severe fatigue n.8				
	No.	%	No.	%	No.	%			
Age group									
• < 34 years	34	64.2	16	30.2	3	5.7	53	3.81	0.15
• ≥35 years	26	45.6	26	45.6	5	8.8	57		
Education									
• Secondary school	39	57.4	26	38.2	3	4.4	68	2.26	0.32
• University	21	50.0	16	38.1	5	11.9	42		
Residence									
• Urban	45	61.6	23	31.5	5	6.8	73	4.59	0.1
• Rural	15	40.5	19	51.4	3	8.1	37		
Occupation									
• Working	28	56.0	17	34.0	5	10.0	50	1.39	0.498
• Housewife	32	53.3	25	41.7	3	5.0	60		
Income									
• Insufficient	3	50.0	3	50.0	0	.0	6	2.05	0.73
• Sufficient	49	53.8	34	37.4	8	8.8	91		
• Sufficient and save	8	61.5	5	38.5	0	.0	13		
Medical Problems									
• Present	19	51.4	15	40.5	3	8.1	37	0.24	0.89
• Absent	41	56.2	27	37.0	5	6.8	73		
Surgical History									
• Yes	44	53.7	30	36.6	8	9.8	82	2.99	0.22
• No	16	57.1	12	42.9	0	.0	28		

χ 2:Chisquare test, * p:<0.05 significant, p:>0.05 non-significant

Table (7): Correlation Matrix between Knowledge Score, Fatigue Score and Hemoglobin Level pre, post Intervention Program (n.110):

Pre	Knowledge score		Fatigue score	
	r	p	r	p
Total fatigue score	-0.07	0.468	1	
Hemoglobin value	.199*	0.037	-0.464**	0.0001
Post	Knowledge score		Fatigue score	
	r	p	r	p
Total fatigue score	-0.493**	0.0001	1	
Hemoglobin value	0.388**	0.0001	-0.330**	0.0001

Pearson' correlation coefficient (r) ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

Table (8): Multiple Linear Regression Model for Predicting post Fatigue Score (n.110):

Predictors	**Unstandardized Coefficients**		**t**	**Sig.**
	B	**SE**		
(Constant)	54.4			
Post total knowledge score	-2.158	.408	5.29	.0001
Model	r= 0.56 R^2 =0.31 F =14.3 P=0.0001*			

β = regression coefficients, SE: standard error,R2: R square , f test *significant P<0.05

Discussion:

According to **National Institute of Health and Care Excellence, (2022),** heavy menstrual bleeding is menstrual blood loss that is of sufficient volume to adversely impact a woman's physical, emotional, social, and/or material quality of life (QoL). It is one of the symptoms that comprise abnormal uterine bleeding (AUB) in nonpregnant, reproductive-aged women**.**

HMB is one of the most common gynecologic complaints, and although data from healthcare systems suggest a prevalence of 3% to 5%, population-based studies using definitions like that described previously suggest that it may affect up to 50% of women of reproductive age (**Schoep, et al., 2019).**

The prevalence of HMB perceived to be underreported that's likely because of a lack of recognition by patients and a wide variability in reporting by physicians and other healthcare providers (HCPs). One reason for the disparity in prevalence data on HMB is the historic and cultural aversion to discussing menstruation and its management, even among HCPs **(Henry, Ekeroma, Filoche, 2020).**

Societal and cultural values influence patient reporting and attendance of HCP appointments in a fashion that undermines appropriate assessment and management of HMB. It is estimated that fewer than half of the women who experience HMB visit their HCP, and when they do, the diagnostic evaluation and treatment are often suboptimal. Collectively, these observations likely explain the underestimation of HMB prevalence when the data sources are healthcare system databases **(Silva et al., 2022).**

This study was framed in the light of study hypothesis: A significant improvement in fatigue level will be noticed among women with heavy menstrual bleeding who had received web-based learning guidelines**.**

Regarding age, the current Study revealed that, the mean age of the studied women is (34.6±7.5) years, this could be due to the mean age of reproductivity. This result come in agreement with **(Su et al., 2020)** who studied "Prevalence and knowledge of heavy menstrual bleeding among gynecology outpatients by scanning a WeChat QR Code" in China and stated that more than one third of studied women aged between 31-40 years also **(Da Silva Filho et al., 2021)** who studied "The difficult journey to treatment for women suffering from heavy menstrual bleeding: a multi-national survey" in Brazil and stated that the mean age of studied women was 34.3 years **.**

This result come with inconsistent with **(Ito et al., 2024)** who studied "The quality of life and work productivity are affected by the presence of nausea/vomiting in patients taking iron preparations for heavy menstrual bleeding or anemia: a population-based cross-sectional survey in Japan" and stated that the mean age of studied women was 41.6 ± 7.7 years. Also, **(Da Silva Filho et al., 2023)** who studied "The HOPE study: evaluating the impact of an online educational resource for heavy menstrual

bleeding on the patient–physician dynamic" in Brazil and stated that the mean age of studied women was 39.8 year.

Regarding educational level, the current study revealed that, about two thirds of studied women have secondary school this may be due to that most of women in rural areas take secondary school. This result comes in agreement with **(Leal Filho et al., 2023)** who stated that most of studied women were secondary school, while on the other hand This result comes with disagreement with **(Fraser et al., 2018)** who studied "Prevalence of heavy menstrual bleeding and experiences of affected women in a European patient survey" in Australia and revealed that most of studied women had universal education. Additionally, **(Said, El-Sayed & Hassan, 2022)** revealed nearly half of women had universal education. This may be due to difference in demographic characteristics of each community**.**

Regarding residence, the current study revealed that, nearly two thirds of studied women coming from urban areas. This may be due to the governmental hospital isolated in city and near urban areas. This result come with agreement with **(Fraser et al., 2018)** who stated that, more than half of women in his study comes from urban areas. Additionally**, (Li et al., 2020)** who studied "Unmet needs and experiences of adolescent girls with heavy menstrual bleeding and dysmenorrhea: a qualitative study. Journal of pediatric and adolescent gynecology" in Australia and revealed that most of studied participants were coming from urban areas. Meanwhile, this result comes in disagreement with **(Said, El-sayed & Hassan, 2022)** who stated that more than three quarters of studied women from rural residence. This may be attributed to difference in setting and study subjects**.**

In regard to the occupation, the current study revealed that, more than half of them were housewives. This may be due to decrease the chance of working and most of women preferred to take care of their children. This result comes with agreement with **(Fraser et al., 2018)** who stated that more than one third of women in their study were housewives. On the other hand this result comes in disagreement with **(Ding et al., 2019)** who stated that most of studied women were business service personnel. That may be attributed to difference in study subjects**.**

Concerning income, the current study revealed that, more than three quarters of studied participants has sufficient family income. This may be due to large number of the family members. This result comes in agreement with **(Li et al., 2020**) who revealed that more than half of study participants had sufficient family income. This result comes in disagreement with **(Said, El-Sayed & Hassan , 2022)** who studied women of high family income**.**

Regarding the heavy menstrual bleeding features of the studied women, as evidence from that study, more than two fifth of studied women have intermittent bleeding, duration of HMB for more than two fifth of the studied women is 3 months, more than half of them described their cycle as heavy. Nearly three quarters of studied women get dirty on the under wears. Less than two thirds of studied women have getting dirty on the cloths and nearly half of them during HMB also more than two fifth of them Getting dirty on the bed linens. More than one quarter of them get dirty on the furniture. Moreover, one third of them have family history of HMB. The rational of that is the heavy menstruation affect woman quality of life**.**

This result comes in agreement with **(Li et al., 2020)** who revealed most of study participants had intermittent bleeding, and sometimes had get dirty on the under wears; Meanwhile, This result comes in disagreement with **(Kocaoz, Cirpan & Degirmencioglu, 2019)** who stated only 8.2% of women in their study had intermittent bleeding also the prevalence of HMB was 37.9% in the female population. We found that nearly one quarter of the women perceived the bleeding they experienced during menstruation as heavy or very heavy **.**

Regarding effect of web-based learning guidelines on women' level of fatigue with heavy menstrual bleeding, the present study revealed that, there were highly statistically significant differences between pre and post intervention regarding level of fatigue severity, fatigue impact and total fatigue level. The rational is the ways which the researcher used to decrease fatigue were effective. Women fatigue Level decreased after intervention. This result comes in agreement with **(Kocaoz, Cirpan & Degirmencioglu, 2019)** who stated that there was highly statistically significance regarding fatigue pre and post intervention.

Additionally, **(Ding et al., 2019)** stated that the level of fatigue decreased after intervention. This ensure the effectiveness of the web based learning guidelines**.**

The present study revealed that there was direct significant relation between Knowledge score and Hemoglobin value, pre, post intervention program $p<0.05$. Also, there is inverse significant relation between Knowledge score and total fatigue score post intervention program $p<0.05$. In addition, there is inverse significant relation between fatigue score and hemoglobin value, pre, post intervention program $p<0.05$. That mean when the women knowledge increases the women fatigue score decrease. This result comes with agreement with **(Soliman, 2015)** who stated there was direct significant relation between knowledge score, level of fatigue and hemoglobin value, pre & post intervention

Regarding relationship between women' fatigue level and their demographic & medical history in pre and post intervention phase. The present study reflects that there was no statistically significant relationship between women fatigue level, age, income medical problems education, medical problems, residence occupation and surgical history. The rational of that age, income medical problems education, medical problems, residence occupation and surgical history are not direct causes of women' fatigue level. This result comes with agreement with **(Torossian & Jacelon, 2021)** who studied "chronic illness and fatigue in older individuals: a systematic review" and stated that there was a negative relationship between fatigue and socio-demograpic charactristics of study subjects.

The present study revealed that post total knowledge score was a significant predictor of post intervention fatigue score in studied

women, $p<0.05$. The studied variables can determine more than one third of fatigue ($R2=0.31$). This result comes with agreement with **(Mun & Geng (2019)** who studied "Predicting post-experiment fatigue among healthy young adults: Random Forest regression analysis. Psychological test and assessment modeling" and revealed the relationship between knowledge score and post intervention fatigue score in studied women was highly significance.

Conclusion:

In the light of current study and verified of the research hypothesis, it was concluded that highly statistically significant differences was found regarding total score of women knowledge, and fatigue among women with heavy menstrual bleeding throughout study phases. The study concluded. Additionally, the study reflects direct correlation coefficient between fatigue score among women with HMB throughout study phases.

Recommendations:

In the light of the present study findings, it can be recommended that:

Web based learning guidelines should be part of management plan of all women with heavy menstrual bleeding in all settings.

Health education should include fatigue management strategies as fatigue is the most common symptom of anemia.

Modified assessment scale for heavy menstrual bleeding features among women should be routinely used to all menstruating women to diagnose heavy menstrual bleeding at early stage.

Corresponding Author e-mail:
drahmedshabrawy92@gmail.com

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