

## Effect of WhatsApp Reminder Messages on knowledge and Practices Regarding Breast Self-Examination among Adolescent Female Students

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### Abstract

**Background:** Educating women regarding breast cancer and increasing breast self-examination uptake continues to remain a major challenge despite the intensive campaigns. The provision of health information via WhatsApp media can increase knowledge about breast cancer and improve health. **Aim:** To evaluate the effect of app reminder messages on knowledge and practices regarding breast self-examination among adolescent female students. **Design:** A pre/post-quasi-experimental research design was utilized. **Sample:** A multi-stages technique of purposive sample included 300 adolescent female students selected from two secondary schools at Fayoum City. **Tools:** (1) A structured interview questionnaire, (2) pre & post-knowledge assessment sheet related to breast cancer and breast self-examination and (3) Breast self-examination (BSE) observational checklist, and (4) Satisfaction sheet related to WhatsApp reminder message. **Results:** There was a statistically significant difference between adolescent student's knowledge pre and post what app reminder messages regarding breast self-examination, As regards sources of information about breast cancer, the main source was the media, a statistical improvement was found regarding the BSE checklist pre and post what app reminder messages, there was highly statistically significant ( $P=0.004$ ,  $P=0.005$ ) positive correlation between total knowledge scores and practices after one month what app reminder messages implementation. **Conclusion:** What App reminder messages had a positive effect on improving knowledge and practice of breast self-examination among adolescent students. **Recommendations:** What App reminder messages can be a viable tool that can be used by healthcare workers to educate Adolescent girls regarding breast cancer and breast self-examination and well-informed continuous; health education program should be imparted to adolescent girls.

**Keywords:** Adolescent female students, Breast self-examination, knowledge, and practice, What App reminder messages

### Introduction:

Adolescence refers to the phase in human growth and development occurring after childhood and before adulthood. It represents one of the critical transitions in one's life span. It is characterized by fast-paced growth and change. There are some noticeable changes and development in the biological process. For example, gaining puberty and experiencing an alteration in tone are the most common phenomena. The time of adolescence is a period of preparation for adulthood as such occur some acute psychological changes in youth. Flourishing of personality is introduced in this stage (Prasanna, 2021).

Cancer is considered a leading cause of death worldwide (Dolar et al., 2018). Breast cancer is the most common cancer among Egyptian women. Breast cancer Incidence is 18.9% of every one of cancer cases '35.1% in women. In Egypt breast cancer is represented at 24 per 100 000 cases, breast cancer mortality rate is 9.3% of all cancers (Mortada and El Safie, 2019).

Breast cancer is the most common type of cancer in women and it is increasing due to increasing life expectancy, increase urbanization and adoption of western lifestyles, illiteracy, lack of awareness, financial constraints, lack of an organized breast cancer

screening program, paucity of diagnostic aids that may lead to diagnosis in very late stages. There are many predisposing factors are considered as the risk factor for breast cancer such as gender, age, race, family history, genetic factors, personal health history, menstrual and reproductive history, certain genome changes, dense breast tissue, lack of physical activity, poor diet, overweight or obese, lack of awareness drinking alcohol, radiation to the chest and combined hormone replacement therapy (Townsend et al., 2017).

Types of breast cancer are often divided into non-invasive breast cancer (carcinoma in situ), invasive breast cancer, and other less common types of breast cancer as invasive (and pre-invasive) lobular breast cancer and inflammatory breast cancer and Paget's disease of the breast (Warner, 2017).

Many signs and symptoms are associated with breast cancer that includes a breast lump, Change in the size, shape, or appearance of a breast, Changes to the skin over the breast, such as dimpling, A newly inverted nipple, Peeling, scaling, crusting, and Redness or pitting of the skin over your breast. Diagnosing breast cancer is diagnosed through, examining your breasts and breast screening (mammography) or a biopsy. Treating breast cancer can be treated through using a combination of surgery, chemotherapy, radiotherapy (American Cancer Society, 2017).

A multidisciplinary approach to early detect breast cancer detection is essential that can reduce morbidity and mortality through screening programs because it enhances the chances for successful treatment and cure of the disease and also improves chances of survival and decreases the need for invasive treatment (Omoyeni et al., 2017).

WHO promotes breast cancer control within the context of national cancer control programmers and integrated into non-communicable disease prevention and control. A national cancer control program is a public health program designed to reduce the number of cancer cases and deaths and improve the quality of life of cancer patients, through the systematic and equitable implementation of evidence-based strategies for prevention, early

detection, diagnosis, treatment, and palliation, making the best use of available resources (American Cancer Society, 2017).

Causes of breast cancer aren't completely understood, it can be prevented by knowing the risk of developing the condition and by some treatments that are available and can reduce the risk. Help the women who are risk factors to maintain a healthy weight, exercise regularly, having a low intake of fat and alcohol (Lea, 2018).

Early detection plays a vital role in breast cancer *Breast Self-Examination* (BSE), mammography, and clinical breast examination are screening methods, which are helping to detect breast cancer early. Although BSE alone is not sufficient for early detection of breast cancer, it allows females to be aware of their health and know breast tissue, as well as preventive health behavior (Fotedar, et al., 2017).

Breast self-examination is considered a good idea: it is inexpensive, simple, and provides service to people without access to mammography and comparatively, it is easy, painless, non-invasive, self-care action, and can be performed secretly. It allows females to promote health and teaches them about their bodies (Salama et al., 2019).

Breast self-examination is a screening method that should be taught at early ages to aware women of the importance of early detection of breast cancer. This screening method can be performed without the assistance of health professionals and requires no special equipment (Anakwenze et al., 2015).

Breast self-examination can be demonstrated through many methods as the adolescent female students stand in front of a mirror with the torso exposed to view and look in the mirror for visual signs of dimpling, swelling, or redness on or near the breasts. This is usually repeated in several positions, such as while having hands on the hips, and then again with arms held overhead (Beaber, 2014).

Breast self-examination education and observance are good ways to promote health behaviors associated with clinical breast examination and mammography showing later

in life. BSE is at least as effective in reducing mortality. Mammography detects many non-infiltrating and small, non-palpable tumors (Mohamed et al., 2019).

Breast self-examination can be an important tool in diagnosing breast cancer at an early stage. It helps in observing and identifying changes in breasts that require further evaluation and treatment. 40% of breast lesions can be detected by (BSE) by improving BSE ' knowledge and practices of females that can help in early detection by demonstrating health education programs to increase the awareness and practice about BSE (Verma, 2016).

Early detection and improving knowledge must be accessed through mass media to help educate about cancer and improve population behavior because the female who correctly practices BSE monthly are more likely to detect a lump in the early stage which helps in early diagnosis and treatment. Women are more likely to perform BSE effectively when taught by physicians or a nurse (Sulik, 2014).

Social media platforms such as Facebook, Instagram, WhatsApp, Snapchat, and Twitter can be used to provide continuous support and effective communication and overcome barriers associated with face-to-face modalities. Patients consider social media as a resource for disease-specific information, interacting with others quickly and efficiently, and sharing medical information with a community of patients experiencing similar issues ( Omar et al.,2020).

Nowadays, modern technical developments and procedures used to decrease illness transmission between people, such as keeping at home, limiting access to nursing homes, and preventing meetings at places, are used to minimize disease transmission between people (Masonbrink & Hurley, 2020). Individuals in the community use information technology mean like social media to raise awareness, educate, and track health-related events in the wake of the COVID-19 lockdown (Kamel Boulos, 2019).

Social media is defined as websites and programs that enable users to generate and share information or participate in social

networking (Dictionary O Social media Oxford Dictionary, 2019). Social media tools are platforms and communities, such as Facebook, Whats app, and FacebookMessenger that allow several people to communicate and interact at the same time (Barrett & Mac Sweeney, 2019). The number of people using social media is continually rising, with over 3.2 billion active users globally. The role of social media varies according to users and non-users, age groups, and demographic populations. Because technological change is linked to linguistic and cultural shift patterns, the role of social media is changing constantly (Statsita, 2019). The use of social media in healthcare is becoming more common to improve communication speed, disseminate accurate information, promote knowledge of support, treatments, and self-care options (Cheraket al., 2020).

The nurses can play an important role in educating women through educational programs in the clinical setting, as well as, through community outreach strategies that suit our social and cultural setting, and they are an important source of information within their social networks (Karayurt, 2018).

They help in the implementation of the preventive measures about breast cancer and provide information about BSE and how to perform correctly, Clinical Breast Examination (CBE) and mammography that are recommended screening tests for early detection of breast cancer. And provide them with a resource to help them demonstrate properly this including the ideal time of the month to perform BSE to allow females to know what is normal and what is abnormal in breast tissue to help in early detection and diagnosis of breast cancer (Nichols, 2019).

#### Significance of the study:

In Egypt, breast cancer is generally detected at late stages 60% of cases are detected in the third stage of breast cancer when treatment options are restricted, and the death rate is high, as breast cancer is a highly serious disease, especially with late diagnosis. Therefore, early detection of breast cancer leads to healthier outcomes and prognosis of breast cancer. BSE makes women more aware of breast structural abnormalities, which in

turn, may direct to an earlier diagnosis of breast cancer (Ibrahim et al., 2018).

Few adolescent girls regularly perform BSE and many do not even know how to perform it. mortality incidence from breast cancer occurs mostly in developing countries, where most cases with breast cancer are detected and diagnosed in late stages due to a lack of knowledge about early detection (WHO, 2020). Therefore, they emphasized the need for providing health information about breast cancer and BSE for Egyptian women. Adolescent girls are an important target group for the promotion of proper health habits, Breast self-examination (BSE) is an important, cheap, effective, and easy to do by adolescent girls for early detection and diagnosis as a preventive health behavior (Avci, et al., 2018).

According to the user's needs, smartphones have a variety of applications such as WhatsApp, Instagram, email, short message service (SMS), and others. Health services can use SMS as a cost-effective reminder of patient medication, but SMS and MMS have been replaced by WhatsApp media, which is popular and facilitates communication and WhatsApp reminders could potentially be useful to adolescent female students who were forced to take in a lot of new information (Statsita, 2019).

#### **Aim of the study:**

To evaluate the effect of What App reminder messages on knowledge and practices regarding breast self-examination among adolescent female students through:

- Assessing adolescent female students' knowledge regarding breast self-examination.
- Assessing adolescent female students' practices regarding breast self-examination.
- Design What App reminder messages regarding breast self-examination based on the actual need of the adolescent female students.
- Determine the effect of What App reminder messages on knowledge and practice among

adolescent female students regarding breast self-examination.

#### **Research Hypothesis**

WhatsApp reminder messages have a positive effect on knowledge and practices regarding breast self-examination among adolescent female students

#### **Subjects and Methods:**

##### **Research design:**

A pre/post-quasi-experimental research design was utilized in the current. It identified a pre-group that is as comparable to the post-group as possible. There were differences in results between before and after groups (Campbell and Stanley, 2015).

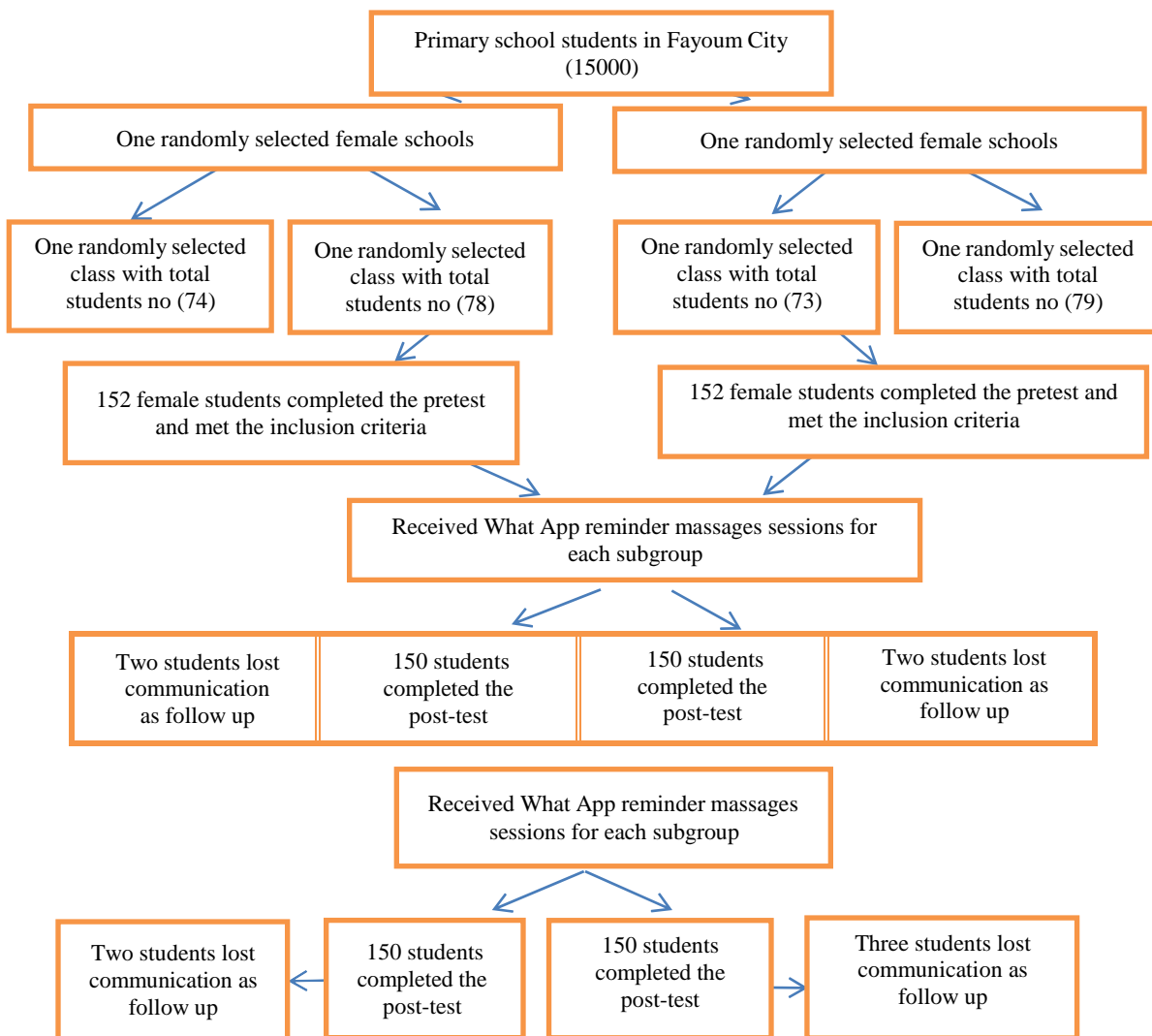
##### **Settings:**

The present study was conducted in Om Elmomenen and Fayoum Althanaweia Banat secondary schools in Fayoum City in Egypt. Fayoum City contains 10 secondary schools. We selected 20% from the total number of schools by stratified random sample which was about two secondary schools.

##### **Subjects:**

A multi-stages technique of purposive sample included 300 adolescent females selected from two female secondary schools at Fayoum City. Four random classes were chosen randomly from each school. The total number of students in secondary schools was about 750 students, we have taken 10% of students from the two selected secondary schools by simple random sample (300 female adolescent students).

The sample size was calculated for the paired sample (before-after study) using the MedCalc software based on the following parameters: Type I error rate/two-tailed test  $\alpha=(0.05)$ , Type II error rate/ $\beta=20$ , Effect size (E)=0.5, SD=1 with 80% power and 95% confidence limit. This resulted in a minimum required sample size of 290. Thus, the final sample size adopted in this study was adjusted to 300 participants to compensate for potential non-response.



**Figure 1:** Graphic illustration of the studied sample flowchart

**Inclusion criteria include:**

- Adolescents aged 16 to 18 year
- Female adolescents students
- Free from chronic diseases

**Tool of data collection:-**

**Tool (1): a structured interview questionnaire:** - It was developed by the researchers after reviewing related literature (Nichols, 2019; Avci, et al., 2018; WHO, 2020). There were two tools used in the current study as the following, it was composed of two parts.

**Part (1):** Included information regarding demographic data such as age, educational level, and residence.

**Part (2):** Included information regarding medical and family history such as questions about the risk factors of breast cancer, family history, personal history of breast lump, and questions about barriers to practice breast self-examination.

**Tool (II):** Pre & post knowledge assessment sheet related to breast cancer and breast self-examination such as the definition of breast cancer, types of breast cancer, risk factors of breast cancer, sign & symptoms of

breast cancer, treatment, types of treatment of breast cancer, preventive ways of breast cancer, and early detection methods and diagnosis of breast cancer. And also includes knowledge about breast self-examination (BSE), hearing about breast self-examination, concept BSE, properties, purposes, importance, frequencies, and the proper time for BSE in accordance with menstrual period and sources of knowledge about BSE (Nichols, 2019; Avci, et al., 2018; WHO, 2020).

#### Scoring system:

(A) The scoring system for the present study was designed as follows:

- Knowledge about breast cancer. It contains 7 questions the scoring process of it was: each right response will take 1 score and zero for no response.
- Assessment of adolescent female student knowledge about BSE. It contains 8 questions, scored as follows: each right response will take 1 score and zero for no response.

The total scores of adolescent students' knowledge were divided into three levels:-

- Score above ( $\geq 65\%$ ) considered good
- Score between ( $50\% - < 65\%$ ) considered fair
- Score less than  $50\%$  was considered poor.

**Tool (III):** Breast self-examination (BSE) observational checklist which includes steps of BSE, positions, sites to be examined, inspection, and palpation technique (Nichols, 2019; WHO, 2020).

#### Scoring system:

The scoring system for adolescent female students' practice was classified as adolescent student's practice about BSE was 22 items. The adolescent students were assigned (2) if their performance was done correctly; assigned (1) if not done and assigned (0) if not applicable.

The total scores of adolescent student' performance were divided into three levels:-

- Score above ( $\geq 65\%$ ) considered good
- Score between ( $50\% - < 65\%$ ) considered fair
- Score less than  $50\%$  was considered poor.

**Tool (IV):** Satisfaction sheet related to WhatsApp reminder message: it included five statements, was the Whats-App reminder messages contents enough, satisfaction with the Whats-App reminder messages, did Whats-App reminder messages improve knowledge and practices, advantages, and disadvantages of the Whats-App reminder messages (Cheraket al., 2020 Statsita, 2019).

#### Scoring system:

- Satisfaction sheet related to WhatsApp reminder message. It contains 5 questions the scoring process of it was: if the response was yes will take 1 score and zero for no response.

#### Tool validity:

The content of the data collection tools was submitted to a panel of five experts, two professors in community health nursing, and three professors obstetric nursing field with more than ten years of experience in the field. Modifications of the tools were done according to the panel judgment on clarity of sentences, appropriateness of the content, sequence of items, and accuracy of scoring and recording of the items. The content validity index (CVI) was 89% for the tool.

#### Tool Reliability

The tool's reliability was estimated by using the Pearson correlation coefficient test to compare between variables. The Pearson correlation coefficient for the variables ranged between ( $P < 0.5$ ) and ( $P < 0.001$ ), which indicated a highly significant positive correlation between variables of the subjects. Internal consistency of reliability was measured using alpha Cronbach's test was 0.93 for adolescent's knowledge and 0.713 for adolescent's practices.

#### Procedure for Data Collection:

Data were collected from March to May 2018 after obtaining permission from the authorities

Actual fieldwork was carried out in a period of three months from March to May 2021 involving the development, implementation, and evaluation of the Whats-App reminder messages.

**Ethical and administrative considerations:-**

Before starting this study, official approval was obtained from authorities of the study setting to carry out the study. Official permission from the managers of the two secondary schools was obtained. A clear explanation was given about the nature, importance, and expected outcomes of the study to administrators. All adolescent female students were informed about the aim of the study, its benefits, and data collection tools to obtain their acceptance and cooperation. Informed consent was obtained from the adolescent female students and their parents to gain their cooperation. The researcher informed them that their participation in the study is voluntary; they have the right to withdraw from the study at any time, without giving any reason, and that their responses would be held confidentially.

**Pilot study:**

It was carried out on 10 % of the adolescent female students, for modification and clarification, and estimation of the time needed for data collection. The designed tool was tested on adolescent female students. To fill in the tools unclear items were clarified, unnecessary items were omitted and new items were added. Those who shared in the pilot study will be excluded from the study sample.

**Preparatory phase:**

After reviewing relevant current Arabic and English literature, a program in the form of voice messages, text messages, figures, and videos covering various aspects of BSE was designed in the Arabic language to improve adolescent female students' knowledge and promote practices.

**The implementation phase:****Assessment phase:**

The researchers went to the participants' classes and first introduced themselves to the adolescent students and then explained the purpose of the study at the beginning of the interview, so the adolescent female students were reassured that all gathered information will be confidential. The researcher interviewed firstly with the adolescent female students face to face; each interview took about 20-30 minutes before sending Whats-App Reminder Messages. Then, the researcher assessed demographic data & the medical and family history of the adolescent female

students, and Pretest structured questionnaires were completed face-to-face before sending Whats-App Reminder Messages.

The tools were used twice times. At the first time, it was used as a pre-program application for the assessment of adolescent female students' knowledge and practices regarding BSE. Then it was used another time post-program application as follow up after one month to evaluate the effect Whats App reminder messages.

**Intervention phase (Whats-App Reminder Messages):**

The reminder messages were then sent twice daily for 4 weeks, including voice messages, text messages, figures, and videos about knowledge, practice regarding BSE. The content was distributed over the period according to the topics.

**Whats App reminder messages content:**

Adolescent female students received two sessions. The first session was about the knowledge content while the second session was about the practical content of the Whats App reminder messages.

It was about the definition of breast cancer, types of breast cancer, risk factors of breast cancer, sign & symptoms of breast cancer, treatment, types of treatment of breast cancer, preventive ways of breast cancer, and early detection methods and diagnosis of breast cancer. And also includes knowledge about breast self-examination (BSE), hearing about breast self-examination, concept BSE, properties, purposes, importance, frequencies, and the proper time for BSE in accordance with menstrual period and sources of knowledge about BSE. The researchers posted appropriate videos, PowerPoint presentations, and posters about BSE. In addition, the researchers produced online videos and recordings explaining the contents of the booklet to improve adolescent female students' knowledge, practice regarding BSE.

**Evaluation:** It took place one month after the program, to examine the adolescent female students' knowledge and practice was done using the same tools through face-to-face interviews. Each adolescent female student was followed up individually in a special room to keep privacy. The average time spent for

adolescent female students for completion of each knowledge interview was around 30-45 minutes, while the time needed for practice was 20-30 minutes.

### Statistical Analysis:

The data obtained were reviewed, prepared for computer entry, coded, analyzed, and tabulated. Data entry and analysis were done using SPSS 17.0 statistical software package. Data were expressed as mean, SD and number, percentage. Using Manwhitiny test to determine significance for numeric variable and using Chi-Square to determine significance for the non-parametric variable. Using paired T-test for comparison between pre, post, and follow up. Using person's correlation for numeric variable in the same group,  $P > 0.05$  no significant,  $P < 0.05$  significant,  $P < 0.01$  moderate significant and  $P < 0.001$  highly significant.

### Results:

**Table (1)** represented the demographic data of adolescent female students, it was observed that (62%) of them were aged from 16-<17 years, and 39% of them were in first educational level. As regards, residence, (78%) of them were living in urban areas.

**Figure (1):** Illustrated distribution of adolescent female students regarding risk factors of breast cancer, and 77% of adolescent female students reported that family history of breast cancer was the most frequent risk factor followed by a personal history of breast conditions (75%).

**Figure (2)** showed that (90%) of the adolescent female students didn't have a family history of breast cancer but only 10% of them had a family history of breast cancer.

**Figure (3)** revealed that all (100%) of the adolescent female students didn't have a personal history of a breast lump.

**Figure (4):** Showed that the main barrier to practice BSE among the adolescent female students was lack of knowledge.

As regards sources of information about breast cancer, **figure (5)** display that, the main source was the friends (65%), followed by (21%), (9.0%) for books and health team (nurse & physicians) was mentioned by (5%).

**Table (2):** Demonstrated frequency and percentage distribution of the studied adolescent female student's knowledge

regarding breast cancer, it was observed that there was an improvement in adolescent female student's knowledge as compared to pre- what app reminder messages knowledge. There was a highly statistically significant difference between pre and post-one month of what app reminder messages implementation concerning the adolescent student's knowledge regarding breast cancer ( $P$ -value  $< 0.001$ ).

**Table (3)** showed a highly statistically significant difference was found between adolescent female students' knowledge level as pre and post one month of what app reminder messages implementation regarding breast cancer in adolescent female student's levels ( $P = < 0.001$ ). It was observed that all (300) of them had a poor knowledge level regarding breast cancer pre what app reminder messages implementation compared to 70% of them had a good level of knowledge post-implementation

**Figure (6)** reveals that (91%) of adolescent female students didn't hear about breast self-examination (BSE).

**Table (4)** indicated that (90%) of the adolescent female students didn't perform breast self-examination. Concerning the frequency of BSE, 41% of the adolescent female students was done it two times. Regarding the time of performing breast self-examination (40%) of the adolescent female students reported from 5 days to 7 after menstruation and all of them (100%) not done BSE regularly. Regarding why not performed breast self-examination, 65% reported not performing BSE because of lack of awareness about BSE practicing, while 25% mentioned that they have no idea about it (never hear about it).

**Table (5)** revealed that there was improvement regarding the BSE checklist pre and post one month what app reminder messages implementation, where there were highly significant differences ( $P = 0.000$ ) as regards all the steps of BSE checklist except lying down position, place a towel or pillow under shoulder before examining breast on that side there were moderate significant differences ( $P = 0.002$ ). As regarded wedge pattern, it was observed that there is no significant difference pre and post what app reminder messages implementation. Where there were significant differences ( $P = 0.001$ ) as regard examining one breast at a time, using



the pads of the three middle fingers flat and together, begin in a standing position, to palpated your right breast raise your right arm over your head, using the pads of the three middle fingers of your left hand, examine underarm area also.

**Figure (7)** illustrated that there was a highly statistically significant improvement regarding practice levels among adolescent female students pre and post-one-month what app reminder messages implementation.

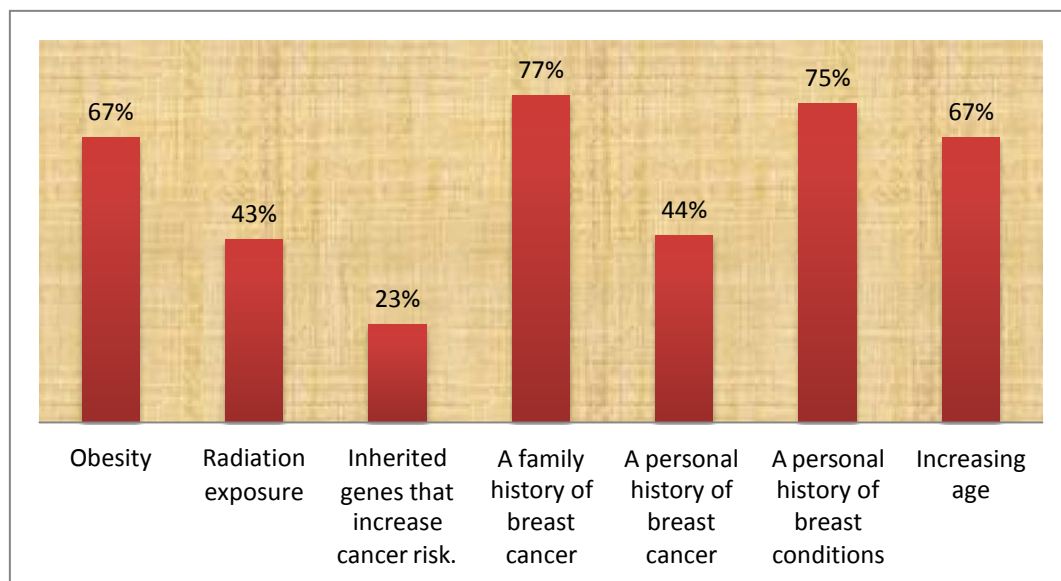
**Table (6)** revealed that there was a highly statistically significant ( $P=0.004$ ) positive correlation between total knowledge scores and their practice at pre and post one month what app reminder messages implementation, respectively.

**Table (7):** Showed the Whats-App reminder messages characteristics, it was noticed that 98% of the adolescent female students reported that Whats-App reminder messages contents were enough, 95% of them were satisfied with the Whats-App reminder messages, 98% of them stated that Whats-App reminder messages improve their knowledge and practices. Concerning the advantages of Whats-App reminder messages, 98% of adolescent female students mentioned that they can participate actively and can reach it at any time and place. Regarding the disadvantages of the Whats-App reminder messages, 97% of adolescent female students reported that interruption of the internet was a common disadvantage.

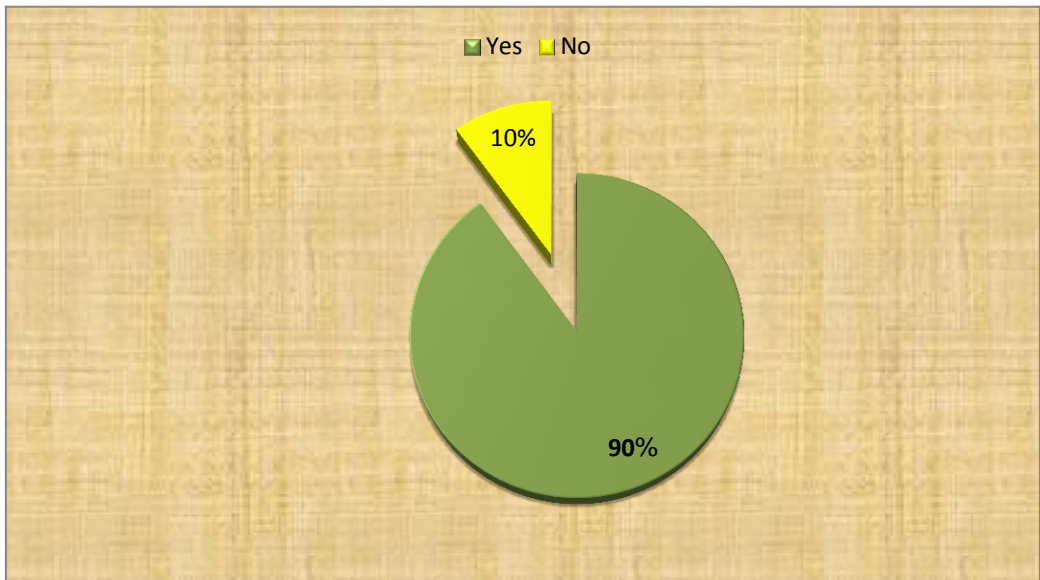
**Table (1):** Percentage distribution of adolescent female students according to their demographic characteristics (300)

Characteristics of adolescent female students	No	%
<b>1- Age(months)</b>		
• 16- <17	186	62.00
• 17-≤ 18	114	38.00
<b>2- Educational level</b>		
• First	117	39.00
• Second	90	30.00
• Third	93	31.00
<b>3- Residence:</b>		
• Urban.	234	78.00
• Rural.	66	22.00

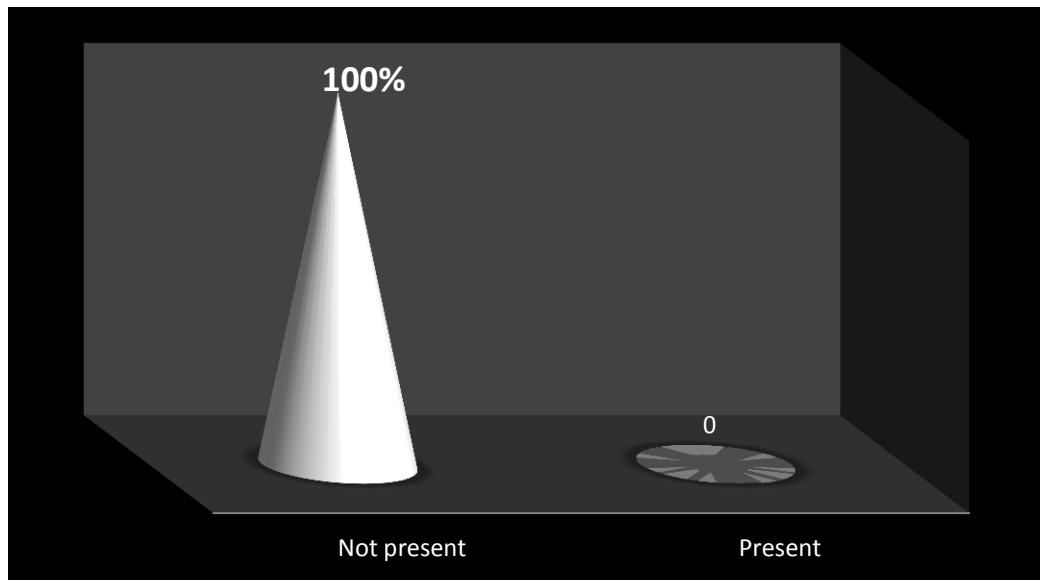
**Figure (1):** Percentage distribution of adolescent female students regarding risk factors of breast cancer (300).



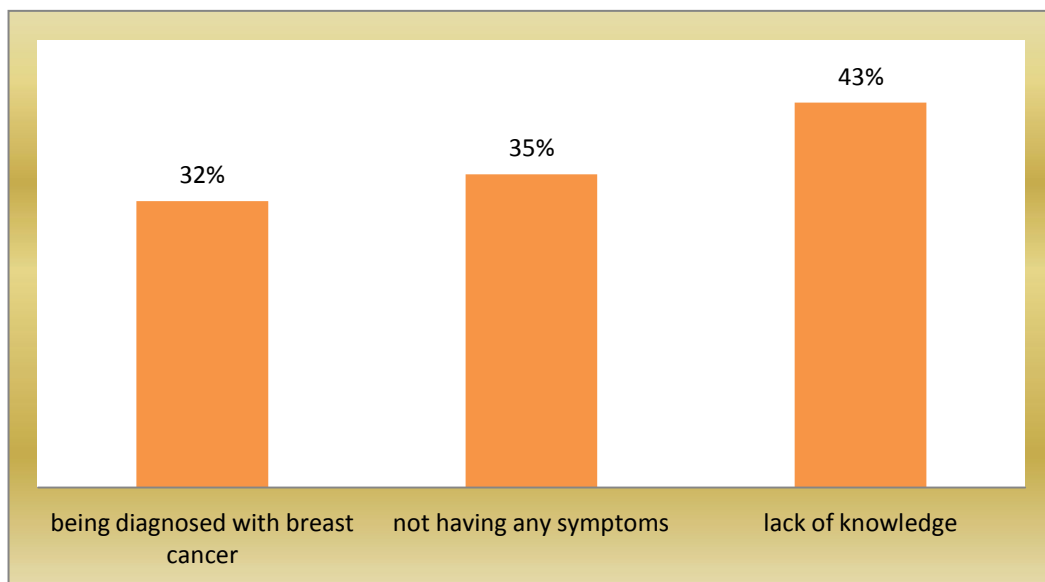
**Figure (2):** Percentage distribution of adolescent female students regarding having a previous family history of breast cancer (300).



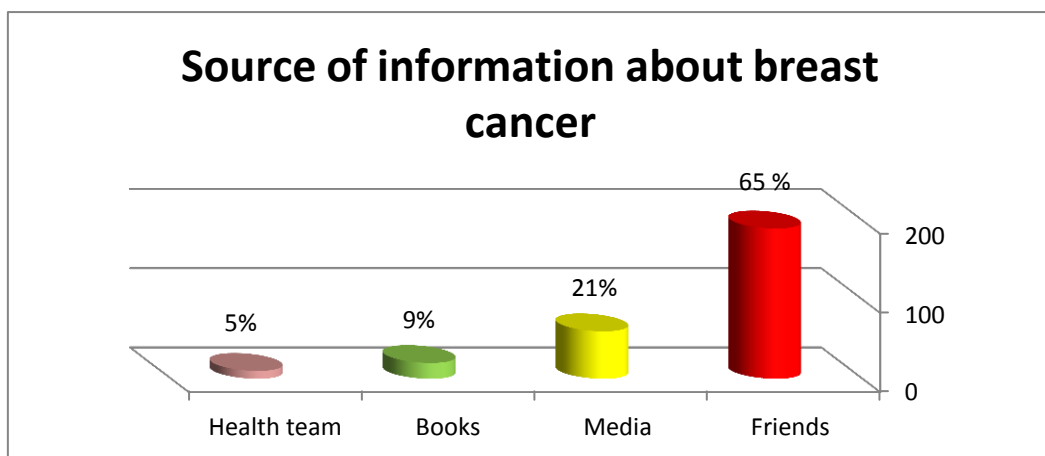
**Figure (3):** Percentage distribution of adolescent female students regarding the presence of a personal history of a breast lump (300)



**Figure (4):** Percentage distribution of adolescent female students concerning barriers to practice breast self-examination (300).



**Figure (5):** Distribution of adolescent female students regarding their source of information about breast cancer (300).



**Table (2):** Frequency and percentage distribution of adolescent female student's knowledge regarding breast cancer as pre and post what app reminder messages implementation (300)

Items of knowledge	Pre-		Post		P – value
	No.	%	No.	%	
1-Definition of breast cancer	87	29	276	92	<0.001*
2-Types of breast cancer	36	12	267	89	<0.001*
3-Risk factors of breast cancer	72	24	270	90	<0.001*
4- Sign and symptoms of breast cancer	69	23	264	88	<0.001*
5- Treatment	66	22	273	91	<0.001*
6-Early detection methods and diagnosis of breast cancer	9	3	270	90	<0.001*
7- Preventive ways of breast cancer	27	9	261	87	<0.001*

**Table (3):** Comparison of adolescent female students' knowledge level related to breast cancer as pre and post one month what app reminder messages implementation (300)

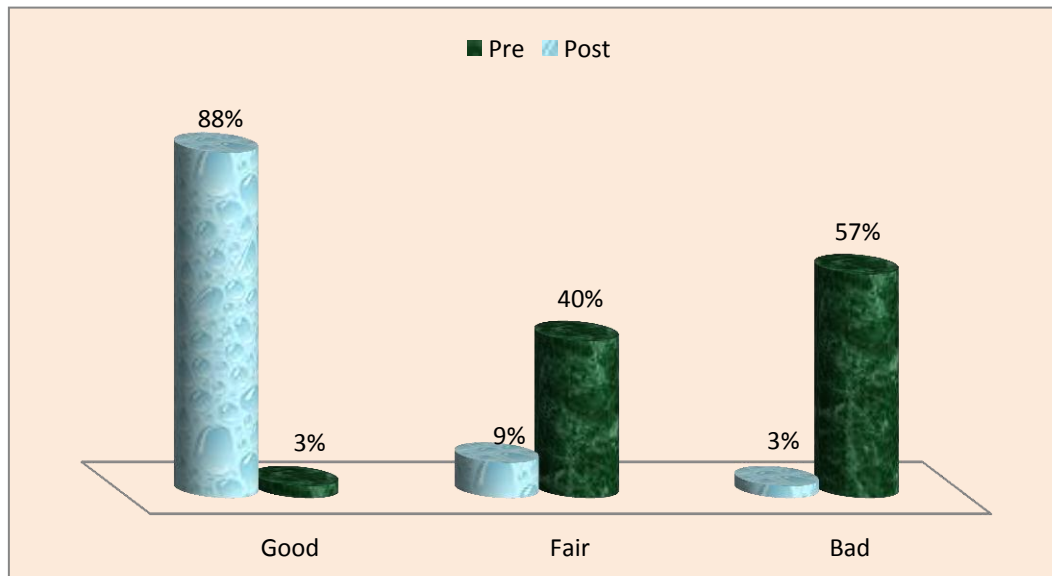
Knowledge level	Pre		Post		P-value
	No.	%	No.	%	
- Poor > "50 "	300	100%	0	0.0	<0.001
-Fair "50- 65"	0	0.0	60	20.0	<0.001
-Good"≥ "65"	0	0.0	240	80.0	<0.001

**Figure (6):** Distribution of adolescent female students as regards their hearing about BSE.**Table (4):** Frequency and percentage distribution of adolescent female student's knowledge regarding the practice of BSE as pre and post what app reminder messages implementation (300)

Items	No	%
<b>BSE practicing</b>		
- No	270	90.0.
- Yes	30	10.0
<b>Frequency of BSE (N=27)</b>		
-One time	1	4.0
-Two times	11	40.0
-Three times	8	30.0
-More than	7	26.0
<b>Time of BSE (N=27)</b>		
- Immediately before menstruation	6	25.0
- During menstruation	5	20.0
- Day 5 to 7 after menstruation	11	40.0
- At any time	5	15.0
<b>Regularity of performing BSE (N=27)</b>		
- Yes	0	0.0
- No	27	100.0
<b>Reasons for not performing BSE (270):</b>		
- Lack of awareness about BSE practicing	175	65.0
- I have no idea about it (never hear about it.	67	25.0
- Fear from detecting breast cancer	14	5.0
- Forgetting	14	5.0

**Table (5):** Frequency and percentage distribution of adolescent female student's practice of BSE checklist pre and post one month what app reminder messages implementation (300)

BSE checklist	Pre		Post one month		P-value
	No.	%	No.	%	
1- Looking at breasts in the mirror with arms on hips	21	7.0	300	100	0.000 ***
2- Looked at both breasts and noted any differences in shape, size, nipple or skin puckering, and dimpling	0	0.0	255	85	0.000 ***
3- Raise arms overhead	24	8.0	282	94	0.000
4- Looked at both breasts and noted any differences in shape, size, nipple or skin puckering, and dimpling.	24	8.0	300	100	0.000 ***
5- look for any signs of fluid coming out of one or both nipples	84	28	300	100	0.000
6- lying down position, place a towel or pillow under shoulder before examining breast on that side	0	0.0	60	20.0	0.002**
7- Use right hand to examine the left breast and left hand to examine the right breast to palpate the breast	0	0.0	294	98.0	0.000
8- Examining one breast at a time	0	0.0	300	100	0.001
9-Using the pads of the three middle fingers flat and together	0	0.0	300	100	0.001
10- Circular pattern	21	7	267	89	0.000
11- Up and down line pattern	0	0.0	270	90	0.000
12-Wedge pattern	0	0.0	0	0.0	---
13-Begin in a standing position	69	23	261	87	0.001
14- To palpated your right breast raise your right arm over your head.	18	6.0	294	98.0	0.001
15- Using the pads of the three middle fingers of your left hand	0	0.0	285	95.0	0.001
16- Circular pattern	18	6.0	267	89	0.000
17- Up and down line pattern	0	0.0	270	90.0	0.000
18-Wedge pattern	0	0.0	0	0.0	---
19- Examine underarm area also	0	0.0	300	100	0.001
20-Repeat this process for the other breast	0	0.0	270	90.0	0.000

**Figure (7):** Comparison of adolescent students 'level of practice related to BSE as pre and post one month what app reminder messages implementation

**Table (6):** Correlation coefficient between total adolescent female students' knowledge and practice scores during pre and post one month what app reminder messages implementation

Items	Practice			
	Pre		Post one month	
	R	P	r	P
- Total knowledge pre-program	0.037	0.813(N.S)	---	---
- Total knowledge post-program	---	---	0.411	0.004

**Table (7):** Percentage distribution of the adolescent female students according to their feedback about Whats-App reminder messages (N=300).

Whats-App reminder messages characteristics	N0	%
<b>Content is enough</b>		
-Yes	294	98
-No	6	2
<b>Satisfied with Whats-App reminder messages content</b>		
-Yes	285	95
-No	15	5
<b>Whats-App reminder messages improve knowledge and practices</b>		
-Yes	294	98
-No	6	2
<b>Advantages of social media-based intervention:</b>		
- Active participation	294	98
-Participants can get a chance for live chat.	288	96
-Participants can reach it at any time and place.	294	98
<b>Disadvantages of Whats-App reminder messages</b>		
- interruption of Internet	291	97
- Participants can not join a social media Intervention with a large sample	9	3

## Discussion

Prevention of breast cancer is very important. So, primary prevention should be given the highest priority in the fight against the disease such as avoidance of fatty foods and obesity, the practice of physical exercises, and intake of soy products. Early detection must be considered the best second choice for reducing mortality through breast self-examination, clinical breast examination, ultrasound, and mammography (Fikry et al., 2018). Support and sufficient WhatsApp reminder messages may help adolescent female students acquire adequate knowledge and skills regarding breast self-examination. Because WhatsApp reminder messages depend on repeating and remembering messages for them through photos, videos, power points to enhance and develop their knowledge, practice. Hence, the study aimed to evaluate the effect of what app reminder messages regarding breast self-examination on knowledge and practice among adolescent female students.

Results of the present study revealed that about ten percent of the studied adolescent female students had a family history of breast cancer. This result is near to the study conducted by (Reem et al., 2014) about "Effect of a health education intervention program regarding breast self-examination on female employees in Damanhour University" and found in their study that less than one-quarter of the study sample had a family history of breast cancer.

As regards, the current study showed that the main barrier to practice BSE among adolescent female students was a lack of knowledge. This is congruent with Al-Naggar et al (2018) found that the main identified barriers to the practice of BSE were lack of information and forgetfulness. Also, they recommended that lack of knowledge is one of the reasons that hinder women to practice BSE.

As regards sources of information about breast cancer, the current study displayed that, the main resource among adolescent female

students was friends. From the researchers' point of view, this is due to a long time that girls spent with each other at the school discussing different issues, which creates strong relations among each other. On the other hand, the study was done by **Budden (2019)** among young Malaysian entitled " Student nurses' breast self-examination health beliefs, attitudes, knowledge, and performance during the first year of a preregistration degree program " and revealed that electronic media such as radio and TV was the most common source of information of BSE.

This result is not similar to the finding conducted by (**Reem et al., 2014**), and these results are in disagreement with the study conducted by (**Saeed et al., 2018**) who studied "Are women in Kuwait aware of breast cancer and its diagnostic procedures?" **Ranasinghe et al., (2019)** found in their study about awareness of breast cancer among adolescent girls in Colombo. Also, the study conducted by (**Akhtari et al., 2013**) entitled "beliefs and behavior of Malaysia undergraduate female students in a public university toward breast self-examination practice" found that girls were aware of breast cancer and breast self-examination practice.

Concerning adolescent female students' knowledge level, the study results revealed that there was a highly statistically significant difference between pre and post one month of what app reminder messages implementation regarding breast cancer and the majority of them had a good level of knowledge post-implementation. From the researchers' point of view, this indicated the positive effect of app reminder messages which reflected on improving adolescent female students' knowledge level. This is explained by that is considered alarming as it represents insufficient health information as regards this health topic and informs the need for health intervention programs to increase health information

Findings of the current study highlighted that most adolescent female students didn't hear about breast self-examination. From the researchers' point of view, this clarifies the need and importance of introducing the Whats App what app reminder messages implementation to the adolescent female students regarding breast cancer and BSE.

This result is similar to the study conducted by (**Kommula et al., 2018**) who noted in their study about awareness and practice of breast self-examination among women in South India that more than three-quarters of the responders stated that they had never known about BSE

The current study indicates that most of the adolescent students didn't perform breast self-examination; this may be explained by insufficient knowledge about BSE, having no idea about BSE. Also, may be related to negative personal and family history about breast cancer because the positive history of any disease may be an indication and encourages the person to seek information about the disease and look for early detection methods. This result also may be attributed to the carelessness of the adolescent female students in seeking proper medical advice, this result is similar to the result conducted by (**Pawan et al., 2017**) who mentioned a study entitled "Knowledge, attitude and preventive practices of South Indian women towards breast cancer" and found a low percentage of students had performed breast self-examination.

Concerning the BSE checklist, the current study revealed that there was improvement regarding the BSE checklist pre and post-one-month what app reminder messages implementation, where there were highly significant differences. From the researchers' point of view, progress and improvement in overall performance related to the effectiveness of what app reminder messages implementation regarding knowledge and practice about BSE. This finding is in congruence with the study carried out by **Moussa and Shalaby (2014)** which aimed to investigate the effect of an educational program about BSE on nursing students' knowledge, attitude, and practice and reported that after the program a significant improvement was observed in the students' practice concerning methods and techniques and total practice score and a highly statistically significant differences were found. These findings also agreed with those of **Moustafa, Abd-Allah, and Taha, (2015)** who found in their study about the effect of a breast-self-examination educational intervention among female university students that, there was a statistically significant improvement in student's practice of BSE after the intervention.

This is consistent with the study done by **Al-Dubais et al (2020)** who studied "Exploration of barriers to breast – Self Examination among Urban Women in Shah Alam, Malaysia" and showed that most of the respondents were aware of BSE. From the researchers' point of view, the sample of the nursing students had previous knowledge regarding BSE from their college curricula

The present study results revealed a highly statistically significant improvement regarding practice levels among adolescent female students pre and post-one-month what app reminder messages implementation. This is reflected the desire of the adolescent female students to improve their practice and know the value and the importance of practicing breast self-examination as a method for early detection of breast cancer, and it is important to educate them about breast self-examination to be started for adolescent female students and make breast self-examination as a habit, these results were in the same line with the results conducted by (**Amany et al., 2017**) who mentioned that there was a highly statistically significant difference between levels of total practice score pre-post program. This finding is consistent with the study done by **Rasu et al., (2017)** who studied "Effect of Educational Level on Knowledge and Use of Breast Cancer Screening Practices in Bangladeshi" and found that participants practice significant improvement in the post-test due to the influence of workshop.

Results of the current study highlighted that a highly statistically significant positive correlation was found between total knowledge scores and their practice at pre and post one month what app reminder messages implementation This indicates the good effect of what app reminder messages implementation on the females' knowledge and practice and reflected their readiness to gain more information and acquire the skill. Also, it emphasized the strong association between knowledge and practice, that gaining knowledge leads to improving practice. This result was similar to results conducted by (**Doshi et al., 2019**) who reported in their study about "breast self-examination: knowledge, attitude, and practice among female dental students in Hyderabad city" that, there was a

highly statistically significant difference between pre and post-test regarding knowledge and practice of BSE. This result is in the same line with the result of **Alkhasawneh et al., (2019)** who revealed statistically improvements in women's knowledge and practice about breast cancer and early detection methods after implementation of the program.

As regards Whats-App reminder messages characteristics, it was noticed that most of the adolescent female students reported that Whats-App reminder messages contents were enough and were satisfied with the Whats-App reminder messages. From the researchers' point of view, this finding may be due to that Whats-App reminder messages contents were prepared with simple Arabic language and had proper photos, videos for clarification and done with nowadays favorite and easy methods by using smartphones and WhatsApp.

The results of the current study are supported the study hypothesis which indicated the positive effect of Whats-App reminder messages implementation in improving adolescent female students' knowledge and practice. This result is in the same line with **Jaesung et al., (2017)** who found that the use of the developed smartphone application increased and improved BSE in females younger than 30 years.

### **Conclusions:**

Based on the results of the current study, it was concluded that; the Adolescent female students' knowledge and practice improved post-exposure to the What App reminder messages. What App reminder messages had a positive effect on improving knowledge and practice of breast self-examination among adolescent students.

### **Recommendations:**

**The following recommendations were suggested based on the results of the present study:**

- What App reminder messages can be a viable tool that can be used by healthcare workers to educate Adolescent girls regarding breast cancer and breast self-examination and well-informed continuous;



health education program should be imparted to adolescent girls.

- Booklets and brochures containing sufficient knowledge about infection control precautions should be printed and kept in a health setting.
- The study can be replicated on a large sample in a different setting so that the findings can be generalized to a large population.
- Adolescent female students should receive an adequate education, simulation, and counseling regarding BSE.
- Assessment of Adolescent female students' needs about BSE performance, knowledge considered as evidence to his educational needs and concern.
- It is important to encourage cooperation between educational institutions, medical care providers, and health personnel to educate student adolescent female students about BSE which will help in increasing awareness.

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