

## Adolescent's Perception Regarding Osteoporosis Risk Factors

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### Abstract

**Background:** Osteoporosis is sometimes referred to a pediatric disease with geriatric outcome. **The study aimed to** assess adolescent's perception regarding osteoporosis risk factors **Research design:** A descriptive study design was used. **Sample:** A Convenient sample of 100 students from technical institute of nursing, Faculty of nursing Ain Shams University. **Tools: First tool:** Self-administered questionnaire to assess female adolescents' general characteristics, their knowledge and practices regarding osteoporosis risk factors. **Second tool:** Lickert attitude scale to assess female adolescent's attitude regarding osteoporosis risk factors. **Results:** 56% of studied adolescent's had poor level of total knowledge score regarding osteoporosis risk factors while 32% of them had a good level of knowledge, 38% of studied adolescent's had a positive attitude regarding osteoporosis risk factors while 62% of them had a negative attitude. There were a highly statistically significant relation between total adolescent's knowledge score and total adolescent's attitude score regarding osteoporosis risk factors. **Conclusion:** Slightly more than half of studied adolescent's had a poor level of knowledge regarding osteoporosis risk factors while one third of them had a good level of knowledge, slightly more than one-third of studied adolescent's had a positive attitude regarding osteoporosis risk factors while two-third of them had a negative attitude. **Recommendations:** The study recommended that: Application of the nursing preventive strategy for osteoporosis on adolescent's girls at secondary school through Design and application for an educational program to increase awareness of female adolescents through (videos, booklets, lectures), Further research regarding the effect of the educational program on adolescent knowledge and practice regarding osteoporosis risk factors.

**Keywords:** Adolescents, Perception, Osteoporosis, Risk Factors.

### Introduction:

Adolescents defined as those aged between 10 and 19 years, adolescence is the socially and culturally important passage from childhood to adulthood (Sheehan et al., 2017), WHO classified adolescent period to Early adolescent from 10-13 to 14-15 years, middle adolescent from 14-15 to 17 years and

late adolescent from 17to 21years (WHO, 2015).

### Perception

(from the Latin Perception) is the organization, identification, and interpretation of sensory information in order to represent and understand the presented information or the environment. Perception is the process by which people translate sensory impressions into a coherent and unified

view of the world around them. Though necessarily based on incomplete and unverified (unreliable) information, perception is equated with reality for most practical purposes and guides human behavior in general **(Keith and Allen, 2019)**.

According to the **National Institutes of Health, (NIH) 2018** osteoporosis and related bone diseases, osteoporosis is defined as a skeletal disorder, characterized by decreased bone mass with a deterioration of micro-architectural bone tissues that leads to decreased bone strength and increased risk of fragility fractures. Osteoporosis and its fractures are considered a major public health burden worldwide. Currently, it is estimated that over 200 million people in the world have osteoporosis, which is causing more than 8.9 million fractures each year **(Alhamam et al., 2020)**

Osteoporosis has two main classifications; primary or idiopathic osteoporosis which includes juvenile, postmenopausal, and senile osteoporosis, it is the most common type of osteoporosis and secondary osteoporosis that result from several diseases, such as diabetes mellitus, thalassemia, rheumatoid arthritis and renal failure or from medications such as, anticoagulants, diuretics. Osteoporosis is sometimes referred to a pediatric disease with geriatric outcome. **(AbdulQadir et al., 2020)**

Several lifestyle modifications may improve musculoskeletal integrity and balance, preserve bone strength, and prevent future fractures. These include an adequate intake of calcium and vitamin D lifelong participation in regular, weight-bearing, resistance exercise and balance-improving exercises to minimize falls,

avoiding use of tobacco and excessive use of alcohol and elimination of potential risk factors for falling. This “bone healthy” lifestyle is important for everyone, not just patients with osteoporosis **(Kanis et al., 2018)**.

Osteoporosis Prevention must begin early and continue throughout one’s life. Childhood, adolescence, and early adulthood are the best times to build a healthy skeleton. In women, maximum bone mass is formed by the age of 25 to 30. To prevent osteoporosis, it is crucial to get enough calcium and weight-bearing exercise throughout life. Osteoporosis prevention and treatment education is on developing healthy lifestyle habits, specifically engaging in weight bearing physical activity, intake vitamin D, and consuming sufficient amounts of dietary calcium to prevent bone loss **(Lorbergs and Holland, 2016)**.

There is evidence suggesting that knowledge on osteoporosis is a major contributor to osteoporosis preventive behaviors, people change their behavior when they understand that the disease is serious, otherwise they might not turn to healthy behaviors. For chronic condition like osteoporosis, the health care system needs to focus on disease prevention through education and self-management support. Effective health education interventions have been identified as those which provide knowledge and skills and attitude related to osteoporosis **(Bernstein and Douglas, 2017)**

Nurse play a key role in osteoporosis management Because they see patients over the entire life cycle, they can promote bone health during the stages of bone growth, consolidation and loss (primary prevention), detect people with

osteoporosis and provide timely treatment (secondary prevention), and ensure that every patient who has had a fragility fracture receives integrated fracture care, rehabilitation and osteoporosis management (tertiary prevention) (Aboushady, Mohamed, El-saidy, 2017)

### **Significance of the study:**

Osteoporosis is considered a major health problem in **Egypt** as 6.5% of females aged 20 years and above suffers from osteopenia and 12.6% of women in same age group suffer from osteoporosis. Egyptian women have generally lower bone mineral density compared to women in western countries due to sun exposure is limited partially due to the cultural practice of covering the whole body with clothes, dark skin color and prolonged breastfeeding without taking vitamin D supplements. Osteoporosis affects about 200 million women **worldwide** (IOF, 2016). Prevention of osteoporosis during childhood and adolescents is the one of the most important concerns.

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

This study aimed to assess adolescent's perception regarding osteoporosis risk factors. Through answer the following **Research questions:**

1. What is the adolescent's knowledge regarding osteoporosis risk factors?
2. What is the adolescent's attitude regarding osteoporosis risk factors?

### **Subjects and Methods:**

**I. Technical design:** It was used for the study covers the following four main headings:

**1-Research design:** A descriptive study design was used.

**2-Setting:** The study was conducted at the Technical Institute of Nursing at the Faculty of Nursing, Ain Shams University, and this place was chosen because of the large number of adolescent girls in this educational stage.

### **3-Subject:**

#### **Sample type:**

A Convenient sample was used. (Age group from 10 to 21 years)

#### **Sample size:**

This study included all female students in the 1st year of the technical institute of nursing that was included in this study (118 female adolescents). Eight students drop out of the study (5 students refused to participate in the study and 3 students were not regular in attendance because of they were remaining for repeat of this year), 10% of the sample excluded for the pilot study (10 students), the actual sample size was 100 students.

### **4-Tools of data collection:**

**Tool I-Self-** administered questionnaire: it was modified by the researcher based on recent literature reviewing (Mohamed et al., 2014) and it consisted of 20 questions, including two parts:

**Part I:** Personal characteristics of the female adolescent's as (age, marital status and place of residence) (questions 1 – 5).

**Part II:** It was designed to assess female adolescent's knowledge regarding osteoporosis and osteoporosis risk factors

(definition, types, risk factors, signs & symptoms, complication and prevention of osteoporosis) using closed-end questions, multiple-choice questions, (questions 6 to 20).

#### ❖ Knowledge scoring system:

Each knowledge question was scored as (3) for correct answer, (2) for incomplete answer, and (1) for incorrect answer or I don't know. The total score was ranged from zero to 45; students' total score was classified as following:

- Poor level of knowledge: (< 50%)  
Score (0 –22).
- Average level of knowledge: (50-74 %)  
Score (22.5- 33.5)
- Good level of knowledge: ( $\geq$ 75%)  
Score (34- 45)

**Tool II: Likert Attitude scale:** It was adopted from (Kim et al., 1991) to assess female adolescent's attitude regarding osteoporosis risk factors. It contains 18 statements and was rated by the three- points Likert Scale (agree, uncertain, and disagree).

#### ❖ Attitude scoring system:

The scoring system ranged from (1:3) in which score (1) denotes disagree, score (2) denotes uncertain and a score of (3) denotes agree and total score ranged from (0-54). The total attitude score was classified as the following;

- Negative: (<70%) corresponding (0-38).
- Positive: ( $\geq$ 70%) corresponding (39-54).

#### Validity and Reliability:

##### Validity:

The face and content validity of the study tools was assessed by a jury

consisted of experts in the maternity and gynecological nursing department of faculty of nursing, Ain Shams University for comprehensiveness, accuracy, and clarity in language.

##### Reliability:

Study tools were tested for its internal consistency by Cronbach's Alpha. It was 0.874 for the questionnaire, and 0.815 for the Likert attitude scale.

##### Ethical considerations:

Informed consent was obtained from each female adolescent after explaining the purpose of the study. Tools of data collections were not touching the moral, religious, ethical, and cultural aspects of female adolescent. Each female adolescent had the right to withdraw from the study at any time. Human rights were considered. Data was confidential and using a coding system for data management.

#### II- Administrative Design:

Official approval was obtained from the head of the maternity and gynecological department then approval was issued from the dean of faculty of nursing Ain Shams University and the director of the technical clinical institute, Ain Shams University after explaining the aim of the study to get permission for data collection.

#### III- Operational Design:

The operational design for this study was included preparatory phases, pilot study, and fieldwork.

### Preparatory phase:

This phase was started with a review of current and past, national and international related literature concerning the subjects of the study, using textbooks, articles, journals, and websites. This review was helpful to the researcher in reviewing and developing the data collection tools, and then the researcher has tested the validity of the tool through a jury of expertise to test the content, knowledge, accuracy, and relevance of questions for tools.

### Pilot study:

A pilot study was carried out on 10% of female adolescent's (10 female students) from the technical institute understudy for testing clarity arrangement of the applicability of the items of the data collection tools and the time-consuming for each tool. The female adolescents recruited in the pilot study were excluded from the current study subjects and doing some modifications in tools of data collection.

### Fieldwork:

The researcher started attended the technical institute to collected data from 25/2/2018 to 20/4/2018 and attended 3 times per week from 9 AM to 2 PM in class room during rest time between lectures, each day group of students was interviewed and assessed students were selected according to their sequence institute from registration book. At the beginning of interview, the researcher starts to introduce herself, briefly explains the study objectives, orients the students under study to the kind type of questions then oral consent from student was obtained. Firstly, each group of female adolescent student were interviewed utilizing self-administer interviewing

questionnaire to assess their personal characteristics, their knowledge and practices and attitude regarding osteoporosis risk factors. The duration for each interview was 30 minutes. This was repeated till the sample size reached 100students.

### IV. Statistical design:

The collected data were organized, categorized, tabulated, and analyzed using the statistical software package for social sciences (SPSS version 18 Program). Data were presented in tables and charts using numbers, percentages, means, standard deviations, **Chi square test** was used to examine the relationship between two qualitative variables but when the expected count is less than 5 in more than 20% of the cells; Fisher's Exact Test was used.

### Levels of significance:

- $P > 0.05$ : Insignificant (NS)
- $P < 0.05$ : Significant (S)
- $P < 0.01$ : Highly significant (HS)

### Limitations of the study:

Eight female adolescents drop out from the study (5students refused to participate in the study, 3 students were not regular in attendance because of they were remaining for repeat of this year)

### Results:

**Table (1):** Shows that, (76%) of female adolescent's ages ranged from (18 – 20) years old with a Mean age of **19.07 ± 0.725**, 50%of them had a diploma in nursing, 73% of them were from rural areas and 98% of studied adolescents were single.

**Table (2):** Reveals that, 52% of female adolescents had correct answer regarding definition of osteoporosis, 59% of them had incorrect answer related to types of osteoporosis, 55% of them had incorrect answer regarding symptoms, 51% of them had correct answer regarding complication, While 33% of them had incorrect and incomplete answer regarding preventive measures of osteoporosis respectively.

**Figure (1):** Percentage distribution of female adolescent's according to their total knowledge score about osteoporosis

**Table (3):** show that, 39% of female adolescent consider female or male gender is a risk factor for osteoporosis, while 59% of the studied adolescent's don't know about female and male gender is considered a risk factor, 33% of them consider caffeine (tea, coffee, soda) consumption is a risk factor but 59% of them don't know about Caffeine (tea, coffee, soda) consumption is a risk factor, 41% of them consider Heredity is a contributing risk factor, 47% of them consider The small amount of Calcium absorption and shortage of vitamin D are a risk factor, 31% of them consider lack of Exposure to Sunlight is a risk factor, while 66% of them don't know about lack of exposure to Sunlight is considered as a risk factor of osteoporosis.

**Figure (2):** Distribution of female adolescent's according to their total knowledge about osteoporosis risk factors.

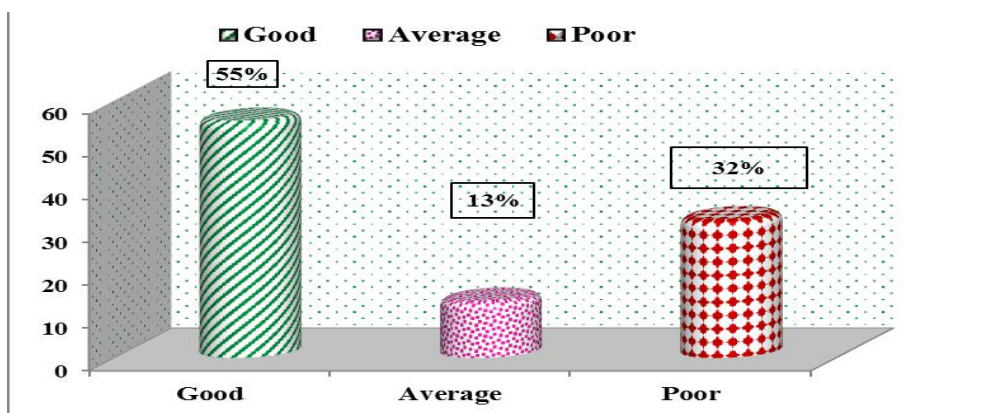
**Figure (3):** Percentage distribution of female adolescent's according to total Self-care practices regarding osteoporosis risk factors.

**Table (4):** illustrates that, 40% of the female adolescent's uncertain of osteoporosis is directly responsible for bone fracture, 54% of them disagree of A potential outcome of the disease is death, 55% of them disagree about Feel better when taking enough calcium to prevent osteoporosis, 56% of them disagree of taking in enough calcium cuts down on chances of broken bones, 46% of them disagree of a calcium-rich diet has important to prevent osteoporosis disease, 74% disagree of There are a treatment for osteoporosis, 53% of them disagree of Impossible to prevent osteoporosis disease.

**Figure (4):** Percentage distribution of female adolescent's according to their total attitude score regarding osteoporosis risk factors.

**Table (5):** presents a highly statistically significant relation between total adolescent's knowledge and adolescent's attitude regarding osteoporosis risk factors.

**Figure (1):** Percentage distribution of female adolescents according to their total knowledge score about osteoporosis.

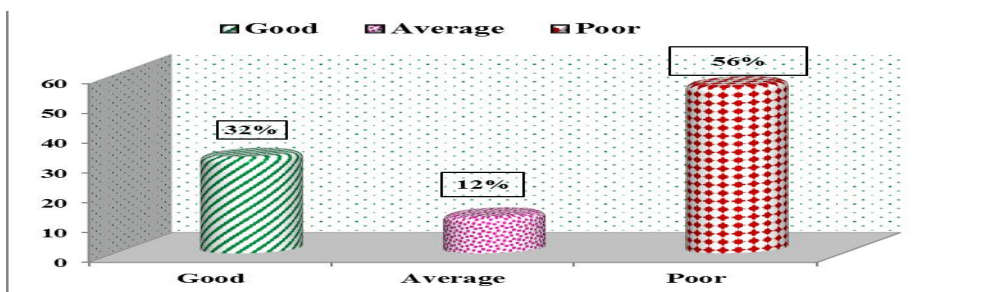


**Table (1):** Distribution of female adolescent's according to their personal characteristics.

Personal characteristics	Total number = 100	
	N	%
<b>Age/ years</b>		
18 > 20	76	76.0
20 > 22	24	24.0
<b>Mean ± SD</b>	19.07 ± 0.725	
<b>Level of education</b>		
Diploma of nursing	50	50.0
Secondary education	50	50.0
<b>Residence</b>		
Rural	73	73.0
Urban	27	27.0
<b>Marital status</b>		
Single	98	98.0
Married	2	2.0

**Table (2):** Distribution of female adolescent's according to their knowledge regarding osteoporosis.

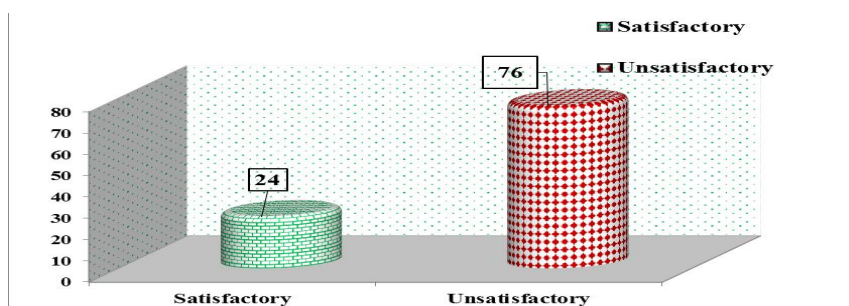
Adolescent's knowledge	Total number = 100					
	Correct		Incomplete		Incorrect	
	N	%	N	%	N	%
Definition of osteoporosis	52	52.0	0	0.0	48	48.0
Types of osteoporosis	41	41.0	0	0.0	59	59.0
Symptoms of osteoporosis	35	35.0	10	10.0	55	55.0
Complications of osteoporosis	51	51.0	22	22.0	27	27.0
Preventive measures of osteoporosis	34	34.0	33	33.0	33	33.0



**Figure (2):** Distribution of studied adolescents according to their total knowledge about osteoporosis risk factors

**Table (3):** Distribution of female adolescent's according to their knowledge about osteoporosis risk factors.

Adolescents' risk factors knowledge	Correct		Incorrect		I don't know	
	N	%	N	%	N	%
-Female or male gender is consider a risk factor for osteoporosis	39	39.0	2	2.00	59	59.0
-Caffeine (tea, coffee, soda) consumption is a risk factor for osteoporosis	33	33.0	8	8.0	59	59.0
-Heredity is contribute a risk for osteoporosis	41	41.0	6	6.0	53	53.0
Some medications contribute as a risk factor for osteoporosis	36	36.0	9	9.0	55	55.0
-The small amount of Calcium absorption and shortage of vitamin D are a risk for osteoporosis	47	47.0	5	5.0	48	48.0
-Race is consider as a risk factor for osteoporosis	28	28.0	9	9.0	63	63.0
-lack of Exposure to Sunlight is consider as a risk factor for osteoporosis	31	31.0	3	3.0	66	66.0
-Some diseases contribute as a risk factor for osteoporosis	44	44.0	9	9.0	47	47.0

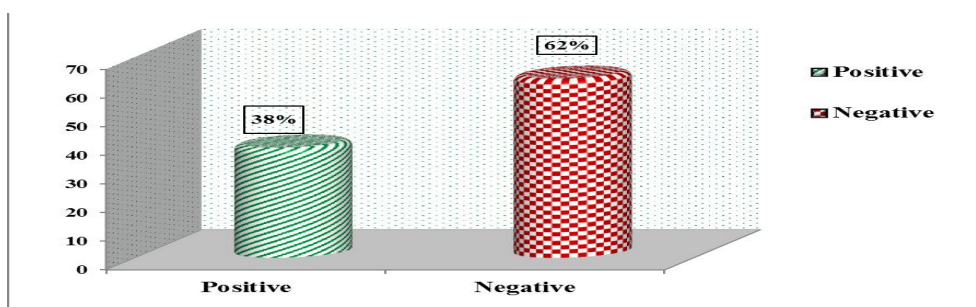


**Figure (3):** Percentage distribution of female adolescent's according to total Self-care practices regarding osteoporosis risk factors.



**Table (4):** Percentage distribution of female adolescent's according to their attitude regarding osteoporosis risk factors.

Adolescents' attitude	Total number = 100		
	Disagree %	Uncertain %	Agree %
1-Osteoporosis is directly responsible for bone fracture	11.0	40.0	49.0
2-A potential outcome of the disease is death	54.0	29.0	17.0
3-Ageing is a risk factor for osteoporosis	8.0	11.0	81.0
4-Thinness or obesity are also consider a risk for osteoporosis	17.0	23.0	60.0
5-Family History for osteoporosis is a risk for osteoporosis	20.0	34.0	46.0
6-Smoking consider a risk factor for osteoporosis	8.0	9.0	83.0
7- Regular exercise helps to build strong bones	27.0	27.0	46.0
8- Practice exercise which prevent osteoporosis improve body posture	12.0	8.0	80.0
9-Feel good when practicing exercise to prevent osteoporosis	36.0	18.0	46.0
10-Foods which rich Calcium cost too much	63.0	10.0	27.0
11-Taking enough calcium prevents painful osteoporosis	25.0	34.0	41.0
12-A calcium-rich diet has important to prevent osteoporosis disease	46.0	10.0	44.0
13-Feel better when take enough calcium to prevent osteoporosis	55.0	15.0	30.0
14-Taking in enough calcium cuts down on chances of broken bones	56.0	10.0	34.0
15-When take enough calcium for preventing osteoporosis the body weight is increase	40.0	18.0	42.0
16- Make a regular health check-up even if not sick	54.0	22.0	24.0
17-There are a treatment for osteoporosis	74.0	13.0	13.0
18-Impossible to prevent osteoporosis disease	53.0	29.0	18.0



**Figure (4):** Percentage distribution of female adolescent's according to their total attitude score regarding osteoporosis risk factors.

**Table (5):** Relation between female adolescents' total knowledge and their total attitude score regarding osteoporosis risk factors.

Items	Total attitude score				Chi Square $\chi^2$	P-value
	Negative		Positive			
	No	%	No	%		
<b>Total knowledge</b>						
Poor	27	84.4	5	15.6	35.15	0.001**
Average	6	46.2	7	53.8		
Good	29	52.7	26	47.3		

(\*\*) highly statistically significant  $p < 0.01$

### Discussion:

WHO identified osteoporosis as one of the health priorities in the Middle East region, aiming at increasing awareness and training regarding osteoporosis among women (WHO, 2017). Osteoporosis is associated with numerous risk factors such as age, gender, menstrual cycle changes, tobacco smoking, alcohol consumption, physical inactivity, and decrease calcium and vitamin-D intake. Such factors disturb bone mass density shaped early in life, doubled by the age of 20 years, and rapidly shrink by the age of 50 years among women. Thus, preserving bone mass early during the first three decades of life for young females through promoting females' knowledge regarding the disease and adopting a healthy lifestyle is an important strategy in reducing the risk of osteoporosis among women (Shawashi and Darawad, 2020).

This study aimed to assess adolescent's knowledge regarding osteoporosis risk factors and assess adolescent's attitude regarding osteoporosis risk factors. This study carried out at the Technical Institute of Nursing affiliated with the Faculty of Nursing, Ain Shams University. The subject of this study included 100 female adolescent students by a convenient sample.

Regarding personal characteristics of the studied adolescents, the findings of the current study reveals that, more than three-quarters of female adolescents between 18 and 20 years old the mean age of them was  $19.07 \pm 0.725$ , half of them had a diploma in nursing, less than three-quarters between them living in rural areas, majority of them are single. The current study findings matching with (Isma'il, Mohamoud, Gamal, 2015) who conducted their study in El Minia, Egypt to assess osteoporosis knowledge and practices among female adolescent students, and revealed that, three-quarters of them ranged between 17 and 18 years, three-quarters of the studied sample were from rural areas and most of them were single.

Also, agree with (Tanveeri, Khalid, Sulaiman, 2018) who conducted their study in Allama Iqbal Medical College" Lahore" to assess Knowledge, Attitude, and Practice (KAP) of osteoporosis Prevention among Female Medical Students, who mentioned that, Age range was from 18 years to 23 years in this study, The similarity between two studies may be due to the same characteristics of the study sample.

The present study finding contrast with (Sabaa et al., 2018) who implemented to evaluate the knowledge, attitude and practice (KAP) of university students towards osteoporosis, and

identify the set of key demographic and socioeconomic factors that jointly influence the KAP of osteoporosis in the United Arab Emirates (UAE) and mentioned that, half of the studied sample were males, majority of them were single, minority of them were complained about a bone disease. More than half of them were pharmacy students, and less than half were dentistry students, The difference between two studies due to difference in Demographic and socioeconomic characteristics.

Regarding the total knowledge score about osteoporosis, the present study finding mentioned that slightly over half of female adolescent's had a good score, while one-third of them had a poor score of knowledge regarding osteoporosis. The present study findings disagrees with **(Ediriweera et al., 2014)** who conducted their study in Sri Lanka to determine the knowledge, beliefs, and practices regarding osteoporosis among young females and reported that, Majority of them had an average score on the knowledge, while around half of them had a poor score total knowledge. The differences between two studies may be due to different culture and demographic characteristics.

The current study supported with a study conducted by **(Bilal et al., 2017)** who implemented their study in Pakistan to assess knowledge, attitudes, and practices about osteoporosis among female medical school entrants in Pakistan and demonstrated that, half of the participants had a good score knowledge about osteoporosis, less than one-third of them had an average score, while one -third of the participants had a poor score about osteoporosis.

The present study result contrast with **(Ramli, Rahman, Haque, 2018)**

who conducted their study in Malaysia to analyze the knowledge, attitude and practice (KAP) regarding osteoporosis among students, who emphasized that, total score of knowledge regarding osteoporosis among the participants was at the moderate/average level. The difference might be attributed to difference culture tradition and setting possibilities between two studies sample.

The present study findings accordance with **(Khan, McGuigan, Akesson, 2019)** who studied to assess awareness and knowledge of osteoporosis among Saudi universities students, and emphasized that, half of the study sample had good knowledge, ninth of them had high knowledge, will one-quarter of them had a poor score of knowledge about osteoporosis.

According to total knowledge about osteoporosis risk factors, the present study shows that, slightly more than half of studied adolescent's had poor level of knowledge while one-third of them had good level of knowledge about osteoporosis risk factors, The current study supported with **(Bakhtyar et al., 2016)**, who conducted their study in Iraq, who reported that, less than half of the study sample had a fair score, while more than half of them had poor score related to knowledge of osteoporosis risk factors.

The current study disagrees with **(Sayaf et al., 2018)**, who carried out their study to measure the knowledge and awareness about risk factors of osteoporosis among young females in King Abdullah Female University KSA Who founded that, most of the studied sample did not have enough knowledge about osteoporosis risk factors. Also, the current study contrast with **(Gharib et al., 2019)**, who achieved their study to assess the awareness and attitudes about

osteoporosis among female medical students at the college of applied medical sciences Taif University, and revealed that, studied sample had the highest level of knowledge about osteoporosis risk factors. The difference may be due to different culture and sample characteristics.

The current study supported with **(Shawashi and Darawad, 2020)**, who reported that, half of the participants had a poor level of knowledge regarding osteoporosis risk factors. This reflects that adolescent needs to increase their awareness regarding osteoporosis risk factors through continues educational programs for them

As regards total self-care practices score, the current study findings demonstrate that, less than one-quarter of female adolescents had a satisfactory practice score while slightly more than three quarters of them had unsatisfactory self-care practices score regarding osteoporosis risk factors. The current study supported with **(Bakhtyar et al., 2016)**, who reported that, less than one-third of the study sample had fair practice score and more than two-thirds of them had a poor practices score. Therefore, extra efforts are needed to bridge between female adolescent's beliefs and actual self-care practices through interventional education programs to fight osteoporosis.

Also, the current study was matching with **(Ramli, Rahman, Haque 2018)**, who reported that, one quarter of the study sample had a good score of total practices, minority of them had fair score, more than half of them had a poor score of total practices.

The current study result on contrast with **(Sabaa et al., 2018)** who show that, most of the studied sample had

good practice score regarding osteoporosis risk factors, The dissimilarity between two studied due to difference in culture tradition and setting.

This in context, with **(Pluskiewicz et al, 2014)**, who emphasized that, healthy lifestyles practices and beliefs in childhood and adolescence may protect them against osteoporosis in later life, the health care system needs to focus on osteoporosis prevention through education and self-management support. Education needed to improve awareness and motivating healthy behaviors, effective health education interventions have been identified as those which provide knowledge, practice and enhance attitude.

Regarding the total attitude score of female adolescent's toward osteoporosis risk factors, the present study reveals that, slightly more than one-third of studied adolescents have a positive attitude while two-thirds of them have a negative attitude regarding to osteoporosis risk factors. The current study results matching with **(Khan et al., 2014)**, who showed that a common negative attitude that was observed among study participants was low perceived seriousness of osteoporosis, This may back to a concept of people believing that osteoporosis is an inevitable part of aging and do not take it as a serious disease that may even cause death.

The present study findings in the same line with **(Ramli, Rahman, Haque 2018)**, who highlighted that one-third of the studied sample had a positive level of attitude while, two-thirds of them had a negative level of attitude regarding osteoporosis risk factors.while, the present study findings disagree with **(Sabaa et al., 2018)** who mentioned that,

satisfactory level of attitude regarding osteoporosis risk factors

In this regard, **(Jeihooni et al., 2016)** who stated that, health care providers need to affect a person's attitude to improve an individual's health. The development of health behaviors in adolescence plays a major role in the prevention of osteoporosis in old ages. In addition, women and girls are the major group at risk of osteoporosis and are more affected by this disease at the later stages of their life.

The present study result disagreed with **(Sayaf et al., 2018)** who conducted their study to measure the knowledge and awareness about risk factors of osteoporosis among young females in King Abdullah Female City at Al-Imam Mohammed ibn Saud Islamic University and mentioned that, positive attitude observed between studied sample. The dissimilarity between two studies may be due to different educational level.

Additionally, **(Chan et al., 2014)** who mentioned that, a critical understanding of individual knowledge and attitude regarding osteoporosis is necessary for planning osteoporosis prevention and lifestyle intervention program, information about the knowledge, attitude, and practices on bone health is important to design osteoporosis prevention programs.

The result of the present study demonstrates that, there is highly statistically significant relation between total knowledge and total attitude score. The present study finding matching with **(El Meselhy et al., 2016)**, who reported that, a highly statistically significant relation between total knowledge and total attitude score, Also, supported with **(Sobeih and Abd Elwahed 2018)**, who

implemented this study in the outpatient clinics (Antenatal Outpatient Clinic and Orthopedic Clinic) affiliated to Ain Shams University Hospitals, who reported that, there was a highly significant correlation among total knowledge and attitude of the studied sample. This emphasized that a significant of knowledge in correcting misconception and misbelieves as well as it is enhanced positive attitude regarding osteoporosis risk factors.

The present finding disagreed with **(Khan et al., 2014)**, who reported that, a weak positive correlation was observed between knowledge and attitude. Also, the current study disagreed with **(Ramli, Rahman, Haque, 2018)**, who founded that there was no statistically significant relation between knowledge and attitude regarding osteoporosis. This may be due to difference in culture and tradition and sample criteria between two studied samples.

The result of the present study demonstrates that, there is highly statistically significant relation between total attitude score and total self-care practices, this finding contrast with **(Khan et al., 2014)**, who reported that, no statistical difference between total self-care practices and attitude while the present study agreed with **(Ramli, Rahman, Haque, 2018)**, who found that there was a significant correlation between attitude and self-care practices regarding osteoporosis.

According to the previously mentioned study finding which pointed out our attention to the importance of more education regarding osteoporosis risk factors of the undergraduate curriculum student to enhance their knowledge, practices, and their attitude

concerning adolescents with osteoporosis risk factors.

Finally, females through the different stages of their life are at risk for osteoporosis. Therefore, an educational program is essential to increase their knowledge and practice and their attitude toward health promotion and prevention of osteoporosis throughout the lifecycle.

### **Recommendations:**

**Based on the result of the study, the following recommendations are proposed:**

1. Application of nursing preventive strategy for osteoporosis on adolescent's girls at secondary school through:
  - a- Design and application of educational program to increase awareness of female adolescents through (videos, booklets, lectures).
  - b- Improve Evidence Based practices information to prevent osteoporosis risk factors through Facebook group or what's App.
2. -Further research regarding the effect of educational program on adolescents' knowledge and practices regarding osteoporosis risk factors.
  - Replicate the study in secondary schools or Non-medical faculties.

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