

# Promoting the Awareness of Premarital Female University Students regarding Risk Factors of Congenital Malformations

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**Abstract:** Congenital malformations contribute a significant proportion of fetal mortality as well as infant morbidity and mortality. It is an intrinsic abnormality of development in a body structure during prenatal life. A congenital anomaly may be viewed as a physical, metabolic or anatomic deviation from the normal pattern of development. There are certain risk factors that can contribute in congenital malformation. Assessing and promoting the awareness of premarital females regarding these risk factors can help future families to avoid psychosocial problems that result from the presence of the affected child in the family. So, the aim of this study is to assess and promote the awareness of premarital female students regarding risk factors of congenital malformations. **Setting:** this study was carried out in three non medical faculties affiliated to Tanta University, Gharbia governorate, Egypt. **Subjects:** 600 female students from third and fourth grades were selected by stratified random sample technique from previous settings (200 students from each faculty). The final number became 530 after excluding missed cases and incomplete questionnaires. **Study tool:** A questionnaire sheet was used to collect the necessary data. It consisted of three parts: *part (1)*; socio-demographic characteristics of the studied females, *part (2)*; medical history, *part (3)*; females' awareness regarding risk factors of congenital malformations. **Results:** the mean age of the studied females was  $21.54 \pm 0.698$  years. Slightly less than two thirds (65.3%) of them were from rural areas. The majority (91.5% and 90.4%) of them had moderate social level and did not study the topic of this study before respectively. There was a significant relationship between the age and income of the studied female students and their total level of awareness. There was a positive significant correlation between relatives and media as sources of females' information and their level of awareness. The *highest* mean scores of females' *awareness* were related to using drugs during pregnancy, environmental factors, tobacco smoking, exposure to certain substances and nutritional factors. The *lowest* mean scores of *awareness* were related to meaning of congenital malformation and its risk factors, probability of discovering the congenital malformation during pregnancy, methods of its prevention, antenatal maternal infections, maternal factors and maternal infectious diseases, hereditary factors and prenatal exposure to certain substances. **Conclusion:** more than one half (52.8 %) of the studied premarital female students had *low* level of awareness regarding risk factors of congenital malformations and more than one quarter (26.4%) of them had *moderate* awareness level. **Recommendations:** 1) information about risk factors of congenital malformation should be included in school education curriculum, 2) good assessment and evaluation of premarital female adolescents, 3) mass media, relatives and health professionals should assume their roles in promoting the awareness of premarital females regarding risk factors of congenital malformation.

**Keywords:** risk factors, congenital, malformation, premarital females.

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## 1. INTRODUCTION

Congenital malformations or congenital anomalies contribute a significant proportion of infant morbidity and mortality as well as fetal mortality<sup>(1)</sup>. Deaths related to congenital anomalies in Egypt reaches to 2.41% of total deaths according to world health organization (WHO) data published in 2011. Furthermore, congenital anomalies deaths in Saudi Arabia reached to 2.92% of total deaths. Based on Egypt Health profile (2012), infant mortality rate due to congenital anomalies constitute about 15% of all infant deaths (24/1000) in Egypt<sup>(2)</sup>.

Congenital anomaly (malformation) was defined as a change produced by an intrinsic abnormality of development in a body structure during prenatal life<sup>(3)</sup>. A congenital anomaly may be viewed as a physical, metabolic or anatomic deviation from the normal pattern of development that is apparent at birth or detected during the first year of life<sup>(4)</sup>.

The causes of congenital anomalies are divided into four broad categories: genetic, environmental, multifactorial and unknown causes. A genetic cause is considered to be responsible in as many as 10-30% of all congenital anomalies, environmental factors in 5-10%, multifactorial in 20-35% and unknown causes were responsible for 30-45% of cases<sup>(5)</sup>.

Additionally, there are certain risk factors that can contribute in congenital malformation as: infectious agent, chemical compounds, radiation, use of medication, maternal metabolic diseases, multiple births, maternal life event stress, prematurity, smoking, alkylating agent and alcohol consumption<sup>(6)</sup>. Furthermore occupational exposure to certain substances has contributed to increased incidence of congenital anomalies<sup>(7)</sup>.

One of the major factors contributing to the increased risk of congenital malformation and infant mortality is consanguineous marriage<sup>(8)</sup>. It is still high in Egypt (35.4%) especially among first cousins (86%). However the frequency varies by region. This favored the appearance of complex phenotypes of genetic disorder<sup>(9)</sup>.

WHO has repeatedly recommended several measures to prevent genetic diseases including health education and the improvement of community knowledge and attitude towards the control of hereditary and genetic diseases<sup>(10)</sup>. In addition, premarital genetic screening and counseling is one of the most important strategies for prevention of genetic disorders and congenital malformations among adolescents<sup>(11)</sup>.

Furthermore, premarital screening and counseling can raise the awareness and knowledge of the community especially premarital females regarding risk factors of congenital malformation as well as the pattern of inheritance and genetic disorders and appropriate methods for selection of the equitable services. Moreover, premarital screening helps families to avoid psychosocial problems that result from the presence of the affected child in the family<sup>(12)</sup>.

The nurse plays an integral role in helping people to prevent hereditary disorders and congenital malformations and its consequential morbidity and mortality. These could be applied through providing information, appropriate supportive counseling, discuss available testing options and guide to genetic services<sup>(13)</sup>.

Those all services should be directed to the more risky groups as premarital females which can benefit from the services and so gain more effective intervention from certain programs. These programs should depend primarily on determining the level of the awareness of such target groups. So, the aim of this study is to assess and promote the awareness of premarital female students regarding risk factors of congenital malformation.

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

The aims of this study are to:

- 1- **Assess** the awareness of premarital female university students regarding risk factors of congenital malformations.
- 2- **Promote** the awareness of premarital female university students regarding risk factors of congenital malformations.

## 2. MATERIALS AND METHOD

### **Materials:**

### **Study design:**

A descriptive cross-sectional analytical study design was used in this study.

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**Setting:**

This study was carried out in three non medical faculties which are selected randomly from nine non medical faculties affiliated to Tanta University, Garbia governorate, Egypt. These faculties are: faculty of agriculture, faculty of rights and faculty of education. The medical faculties were excluded to avoid the contamination of students' knowledge and awareness with the studied information related to the subject of the current study.

**Sample size and sampling technique:**

Stratified random sample technique was used in the selection of the subjects of this study as grade three and four students from the previous settings were included in the study because they were either engaged or expected to be engaged or will married sooner. Females only were chosen to participate. Two hundred (200) females only were chosen randomly from each mentioned faculties including the two grades to participate in the study. The total number became 600 female students expected to participate in the study to cover any losses due to incomplete questionnaires. Only 570 students returned the questionnaire (30 questionnaires were missed). And other forty (40) questionnaires were excluded because of missed or incomplete information. The total accurate complete questionnaires became 530 which were actually coded and analyzed.

**Inclusion criteria:** female students who had willingness to participate in the study.

**Exclusion Criteria:** married students, pregnant students or those who had any children.

**Tool of the study:**

A questionnaire sheet was developed by the researchers to collect the necessary data for this study. It consisted of three parts: **Part (1)**; socio – demographic characteristics of the studied females: it included their age, residence, social state, family income, previous studying this subject and sources of their information. **Part (2)**; Medical history: it included suffering from any of certain health problems as: cardiac diseases, epilepsy, hypertension, renal diseases, diabetes mellitus, hepatic diseases, cancer, respiratory diseases or any type of allergy. **Part (3)**; females' awareness regarding risk factors of congenital malformation: it included main nine categories of risk factors which can affect the fetal formation. These factors included: using of drugs during pregnancy, hereditary factors, antenatal maternal infections, infectious diseases of mothers, maternal factors, environmental factors, tobacco smoking, exposure to certain substances and nutritional factors.

**Method of the study:****Administrative process:**

An official permission was obtained from the deans of the pervious mentioned faculties to conduct the study after explanation the purpose of the study. The students' lectures schedule was obtained from students affairs of each faculty to choose the suitable time for meetings the students. The researcher gained the help of students' leaders from students union of each faculty. They facilitated the work of the researchers in data collection through coordination meetings between the students and the researchers.

**Study tool validation:**

- The study tool was translated into Arabic to gain the understanding of all the study subjects.
- The study tool was tested for its face and content validity by presenting it to a jury committee of five expertises in the study field specialty. It was found to be 93.15%.
- Reliability of the study tool was estimated using cronbakh alpha test which is a model to test the internal consistency, based on the average inter-item correlation. The tool reliability was found to be 0.990.

**Ethical considerations:**

- Formal consent was obtained from all female students to participate in the study.
- The purpose of the study was explained to all participant females.

- Confidentiality and privacy of the collected data were considered and Assured for the studied students.
- The willing to not participate in the study was respected.
- The questionnaire sheet was anonymous.

**Data collection:**

A structured schedule was used by the researchers to collect the data from the mentioned faculties in coordination with the students' affairs and with cooperation of union students in each faculty. Free time between the lectures was chosen to meet the students. The duration of data collection took about 3 months. It extended from March to May 2016.

**Statistical Analysis:**

Collected data were coded, scored and entered into an electronic database. The questions of part one and two of the questionnaire was coded and each question of part three was scored as: affect (2 points), not affect (1 point) and do not know (0 point). The total score was summed and calculated, it ranged from (0-132) with the mean score was  $71.01 \pm 32.676$ . The highest score indicated the higher level of awareness. Data analysis was carried out using statistical package for social sciences, (SPSS) software program version 20. Qualitative data was expressed as numbers and percentages, and the Chi-square test was applied to test the relationship between variables. Significance level was set at  $P < 0.05$

**Nursing intervention:**

After terminating the process of data analysis, the results related to the awareness of the studied female students regarding risk factors of congenital malformations were organized according to the degree of awareness. The risk factors which had the lowest awareness score from the studied females were organized first then the highest awareness risk factors. Then a **guideline booklet** regarding those organized risk factors of congenital malformations was developed by the researchers and revised from number of expertise in the field. The booklet was distributed to the female students in the final grades in non medical faculties at Tanta University to promote their awareness regarding risk factors of congenital malformations.

**3. RESULTS**

**Table (1)** demonstrates the distribution of the studied females according to their socio-demographic characteristics. It shows that the age of more than one half (51.5 %) of the studied females was 22 years old, while it was 21 years old for 37.0 % of them with the mean age  $21.54 \pm 0.698$  years. Slightly less than two thirds (65.3%) of them were from rural areas, while more than one third of them (34.7%) were from urban areas.

The majority (91.5%) of the studied females had moderate social level. And 60.6% of them were single while 39.4% of them were engaged. The family income for most (72.3%) of the studied females was enough, while it was enough and save for slightly less than one fifth (19.8%) of them. The majority (90.4%) of the studied females did not study the topic of this study before.

**Table (1): Distribution of the studied females according to their socio-demographic characteristics**

Categories	The studied females (n=530)	
	N	%
<b>1. Age (years)</b>		
▪ 20	36	6.8
▪ 21	196	37.0
▪ 22	273	51.5
▪ 23	24	4.5
▪ 24	1	0.2
Range	(20-24)	
Mean±SD	$21.54 \pm 0.698$	
<b>2. Residence</b>		
▪ Rural	346	65.3
▪ Urban	184	34.7

<b>3. Social level</b>		
▪ High	40	7.5
▪ Moderate	485	91.5
▪ Low	5	0.9
<b>4. Marital status</b>		
▪ Single	321	60.6
▪ Engaged	209	39.4
<b>5. Family income</b>		
▪ enough and save	105	19.8
▪ enough	383	72.3
▪ Not enough	42	7.9
<b>6. Studied the topic before</b>		
▪ No	479	90.4
▪ Yes	51	9.6

**Table (2)** presents the distribution of the studied females according to the sources of their information about risk factors of congenital malformations. It shows that more than one half (58.5%) of the studied females had any related information about risk factors of congenital malformations. Relatives were the source of information for more than one third (36.1%) of them. And internet was the source of information for 30% of them. Media as well was the source of information for more than one quarter (26.5%) of the studied females. While books and friends were the source of information for 16% and 11% of them respectively.

**Table (2): Distribution of the studied females according to the sources of their information about risk factors of congenital malformations**

<b>Have any related information:</b>	<b>(n = 530)</b>	
	<b>N</b>	<b>%</b>
▪ Yes	310	58.5
▪ No	220	41.5
<b>Sources of females' information:</b>	<b>N</b>	<b>%</b>
	<b>(n = 310)</b>	
✎ <b>Books</b>		
▪ No	259	83.5
▪ Yes	51	16.5
✎ <b>Internet</b>		
▪ No	217	70
▪ Yes	93	30
✎ <b>Media</b>		
▪ No	228	73.5
▪ Yes	82	26.5
✎ <b>Friends</b>		
▪ No	274	88.4
▪ Yes	36	11.6
✎ <b>Relatives</b>		
▪ No	198	63.9
▪ Yes	112	36.1

**Table (3)** shows the distribution of the studied females according to their medical history. It demonstrated that 7.9% and 7% of the studied females suffered from respiratory diseases and hypertension respectively. And 0.8% of them had cardiac diseases or epilepsy. Only 0.6% of them suffered from diseases of urinary system, diabetes mellitus or cancer. Regarding allergy, more than one half (54.7%) of the studied females were suffering from any type of allergy. More than

one quarter (26.4%) of them had allergy from dust and 11.1% from odors. Only 7.4 %, 7.2%, 4.7% and 4.2% of them had allergy from food, cleaning agents, air and medications respectively.

**Table (3): Frequency of medical history among studied females**

Categories	The studied females (n=530)			
	No		Yes	
<b>1. Chronic diseases</b>	N	%	N	%
Cardiac diseases	526	99.2	4	0.8
Epilepsy	526	99.2	4	0.8
Hypertension	493	93.0	37	7.0
Diseases of urinary system	527	99.4	3	0.6
Diabetes mellitus	527	99.4	3	0.6
Hepatic diseases	529	99.8	1	0.2
Cancer	527	99.4	3	0.6
Respiratory diseases	488	92.1	42	7.9
<b>Suffering from any type of allergy:</b>	240	45.3	290	54.7
<b>Type of allergy</b>				
Food	491	92.6	39	7.4
Medication	506	95.5	24	4.5
Dust	390	73.6	140	26.4
Odors	471	88.9	59	11.1
cleaning agents	492	92.8	38	7.2
Air	505	95.3	25	4.7

**Table (4)** demonstrates the distribution of general knowledge about congenital malformations among studied females. It shows that nearly one third (31.7%) of them didn't know the meaning of risk factors. And about one quarter (25.7% and 23.8%) of them respectively either doesn't know or gave incorrect answer regarding the meaning of congenital malformation. The mean score for their knowledge about the probability of discovering the congenital malformation during pregnancy was 2.42±1.815. While it was 3.02±2.219 for their knowledge about methods of prevention the congenital malformations.

**Table (4): Distribution of general knowledge about congenital malformations among studied females**

Categories	The studied sample (n=530)					
	Don't know		Incorrect		Correct	
	N	%	N	%	N	%
1. The meaning of risk factors.	168	31.7	16	3.0	346	65.3
2. The meaning of congenital malformation.	136	25.7	126	23.8	268	50.6
3. Probability of discovering the congenital malformation during pregnancy. Range Mean±SD	(0-6) 2.42±1.815					
4. Methods of prevention of congenital malformation Range Mean±SD	(0-7) 3.02±2.219					

**Table (5)** demonstrates the mean scores of awareness domains among studied females related to risk factors of congenital malformations. It shows that the highest mean scores of females' awareness were related to using drugs during pregnancy, environmental factors, tobacco smoking and exposure to certain substances and nutritional factors (13.09±9.377,

10.01±5.984, 9.46±4.466 and 8.40±5.560 respectively). While the lowest mean scores of females' awareness were related to the meaning of congenital malformation, the meaning of risk factors, probability of discovering the congenital malformation during pregnancy, methods of prevention of congenital malformation and antenatal maternal infections (1.25±0.838, 1.34±0.927, 2.42±1.815, 3.02±2.219 and 3.36±2.290 respectively). The total awareness score was ranged from (0-132) with the mean total score 71.01±32.676.

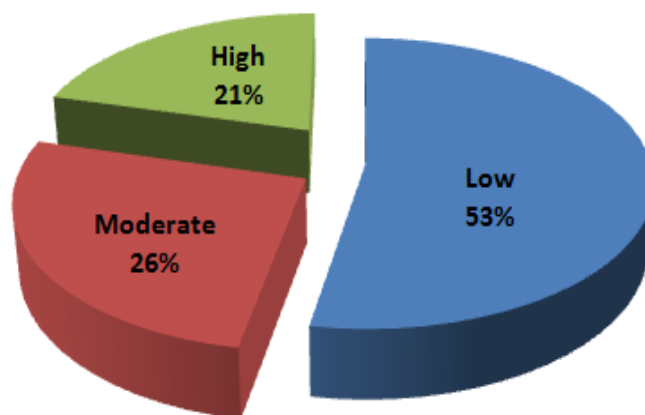
**Table (5): Mean scores of awareness domains among studied females related to risk factors of congenital malformations (n=530)**

Awareness domains	Range	Mean±SD
1. The meaning of risk factors	(0-2)	1.34±0.927
2. the meaning of congenital malformation	(0-2)	1.25±0.838
5. Probability of discovering the congenital malformation during pregnancy.	(0-6)	2.42±1.815
6. Methods of prevention of congenital malformation	(0-7)	3.02±2.219
3. Using drugs during pregnancy	(0-28)	13.09±9.377
4. Hereditary factors	(0-8)	4.77±2.640
5. Antenatal maternal infections	(0-6)	3.36±2.290
6. Maternal infectious diseases	(0-10)	4.33±3.476
7. Maternal factors	(0-8)	4.33±2.782
8. Exposure of the mother during pregnancy	(0-10)	5.25±3.415
9. Environmental factors	(0-18)	10.01±5.984
10. Tobacco Smoking and exposure to certain substances	(0-14)	9.46±4.466
11. Nutritional factors (deficiency of certain substances in pregnant nutrition)	(0-14)	8.40±5.560
<b>Total awareness score</b>	<b>(0-132)</b>	<b>71.01±32.676</b>

**Table (6)** demonstrates the frequency distribution of total awareness level among studied females related to risk factors of congenital malformations. It shows that the total awareness level for more than one half (**52.8 %**) of the studied females was low. And it was moderate for more than one quarter (**26.4%**) of them.

**Table (6): Frequency distribution of total awareness level among studied females (n=530)**

Total awareness level	The studied females (n=530)	
	N	%
<79.8 Low	280	52.8
79.8-99.75 Moderate	140	26.4
>99.75 High	110	20.8



**Figure (1): Frequency distribution of total awareness level among studied females**



**Table (7)** demonstrates the relation between socio-demographic characteristics of the studied females and their total level of awareness. It shows that there was a significant relationship between the age of the studied females and their total level of awareness (p=0.031). As well the relation between females' family income and their total level of awareness was found to be significant (p=0.034).

**Table (7): Relation between socio-demographic characteristics of the studied females and their total level of awareness (n=530)**

socio-demographic characteristics	Level of females awareness						$\chi^2$ P
	<79.8 Low (n=280)		79.8-99.75 Moderate (n=140)		>99.75 High (n=110)		
	N	%	N	%	N	%	
<b>Age:</b>							<b>16.893</b> <b>0.031*</b>
▪ 20	22	7.9	11	7.9	3	2.7	
▪ 21	114	40.7	40	28.6	42	38.2	
▪ 22	128	45.7	85	60.7	60	54.5	
▪ 23	16	5.7	3	2.1	5	4.5	
▪ 24	0	0.0	1	0.7	0	0.0	
<b>Residence:</b>							0.166 0.920
▪ Rural	184	65.7	92	65.7	70	63.6	
▪ Urban	96	34.3	48	34.3	40	36.4	
<b>Social level:</b>							2.972 0.562
▪ High	19	6.8	10	7.1	11	10.0	
▪ Moderate	257	91.8	129	92.1	99	90.0	
▪ low None	4	1.4	1	0.7	0	0.0	
<b>Marital status:</b>							2.361 0.307
▪ Single	169	60.4	91	65.0	61	55.5	
▪ Engaged	111	39.6	49	35.0	49	44.5	
<b>Family income:</b>							<b>10.382</b> <b>0.034*</b>
▪ Enough and save	44	15.7	35	25.0	26	23.6	
▪ enough	214	76.4	98	70.0	71	64.5	
▪ Not enough	22	7.9	7	5.0	13	11.8	
<b>Studied the topic before:</b>							4.087 0.130
▪ No	258	92.1	127	90.7	94	85.5	
▪ Yes	22	7.9	13	9.3	16	14.5	

\* Significant at P < 0.05.

**Table (8)** demonstrates the relation between sources of information of the studied females and their total level of awareness. It shows that there was a significant relationship between the females' information about risk factors of congenital malformations and their total level of awareness (p=0.00). As well the relation between media and relatives as a sources of studied females information and their total level of awareness was found to be significant (p=0.003 and p=0.009 respectively).

**Table (8): Relation between sources of information of the studied females and their total level of awareness**

Sources of information:	Level of students awareness						$\chi^2$ P
	<79.8 Low (n=280)		79.8-99.75 Moderate (n=140)		>99.75 High (n=110)		
	N	%	N	%	N	%	
<b>1. Have any information about risk factors of congenital malformation:</b>							<b>42.318</b> <b>0.00*</b>
▪ Yes	127	45.4	101	72.1	82	74.5	
	153	54.6	39	27.9	28	25.5	



▪ No							
<b>2. Books</b>							
▪ No	258	92.1	123	87.9	98	89.1	2.235
▪ Yes	22	7.9	17	12.1	12	10.9	0.327
<b>3. Internet</b>							
▪ No	237	84.6	110	78.6	90	81.8	2.417
▪ Yes	43	15.4	30	21.4	20	18.2	0.299
<b>4. Media</b>							
▪ No	249	88.9	116	82.9	83	75.5	<b>11.370</b>
▪ Yes	31	11.1	24	17.1	27	24.5	<b>0.003*</b>
<b>5. Friends</b>							
▪ No	261	93.2	133	95.0	100	90.9	1.628
▪ Yes	19	6.8	7	5.0	10	9.1	0.443
<b>6. Relatives</b>							
▪ No	235	83.9	101	72.1	82	74.5	<b>9.335</b>
▪ Yes	45	16.1	39	27.9	28	25.5	<b>0.009*</b>

\* Significant at  $P < 0.05$ .

**Table (9)** presents the correlation between socio-demographic characteristics of the studied females and their level of awareness. It shows that there was a positive strong significant correlation between females' family income which is enough and save from it and their level of awareness where ( $r = 0.112$  &  $p = 0.01$ ). On the other hand, there was a negative strong significant correlation between females who have no information about risk factors of congenital malformation and their level of awareness where ( $r = -0.288$  &  $p = 0.00$ ). Regarding the correlation between sources of females information and their level of awareness, there was a positive strong significant correlation between media as a source of females information and their level of awareness where ( $r = 0.18$  &  $p = 0.00$ ). As well there was a positive significant correlation between relatives as a source of females information and their level of awareness where ( $r = 0.097$  &  $p = 0.025$ ).

**Table (9): Correlation between socio-demographic characteristics of the studied females and their level of awareness**

socio-demographic characteristics	Level of awareness	
	r	P
<b>Age.</b>	0.042	0.340
<b>Residence:</b>		
▪ Rural	-0.015	0.727
▪ Urban	0.015	
<b>Social level.</b>	0.070	0.106
<b>Marital status:</b>		
▪ Single	-0.064	0.142
▪ Engaged	0.064	
<b>Family income:</b>		
▪ enough and save	0.112	<b>0.01**</b>
▪ enough	-0.079	0.068
▪ Not enough	-0.034	0.432
<b>Studied the topic before.</b>	0.077	0.075
<b>Sources of information:</b>		
1.No information	-0.288	<b>0.00**</b>
2. Books	0.046	0.290
3. Internet	0.057	0.189
4. Media	0.18	<b>0.00**</b>
5. Friends	0.050	0.255
6.Relatives	0.097	<b>0.025*</b>

\* Significant at  $P < 0.05$ .

#### 4. DISCUSSION

Congenital malformations have a major impact on the affected families as well as the community as a whole <sup>(14)</sup>. It was revealed that the majority of these malformations occur in middle and low income countries which reflect more closely the seriousness and the major impact of this problem on the affected families and countries <sup>(15, 16)</sup>. Therefore, the assessment of the premarital females' awareness is more important to prevent this problem as well as to develop programs for increasing their awareness about primary prevention.

There are some risk factors which can affect the level of awareness. Socio-demographic characteristics are important indicators to shape the adolescents as well as their susceptibility to genetic diseases <sup>(17)</sup>. The results of the present study revealed that, the age of the studied females ranged from 20-24 years with a mean age  $21.54 \pm 0.698$  years. A study done by Abd Elfattah et al., (2015) revealed that, the mean age of students was  $19.4 \pm 2.1$  years <sup>(11)</sup>. In addition, the results of the present study revealed that, there was statistically significant relationship between the age and family income of the studied premarital university female students and their total level of awareness. This can be clarified that age and more years experience can contribute to the development of correct concepts, which consequently shapes the attitudes and practices of adolescents toward genetic disease <sup>(17)</sup>.

Furthermore, the family income had a positive correlation with females' level of awareness. This means that the higher the family income the increase level of awareness of the studied females. This finding is in agreement with a study performed by Mavrou et al., (1998), who reported that better awareness of congenital anomalies was noted in older age of cosmopolitan with better education, higher family income and residents of cosmopolitan areas <sup>(18)</sup>.

Regarding the residence of the studied females, slightly less than two thirds of them were from rural areas while urban area was the residence for more than one third of them. This may be attributed to that the faculties which data was collected from were affiliated to Tanta University which is a faculty centered the Delta areas and serves several governorates around them which included several rural areas. A study done by Abd Elfattah et al., (2015) revealed that, slightly more than three quarters of their study sample were urban <sup>(11)</sup>. These results of the present study were incongruent with Khamis et al., (2013), who found that slightly more than three quarters of their sample were from urban areas <sup>(17)</sup>. Regarding the social level of the studied females' students, the majority of them were moderate social level. This can be explained that about two thirds of the studied females were from rural areas and the family income for most of them was just enough.

The results of marital status of the studied females' students indicated that 60% of them were single and 39.4% of them were engaged. This could be justified that the studied sample were chosen from final grades (third and fourth grades) of university education and some of them either think in or plan for marriage according to their norms and culture. These results are nearly on the same line with a study done by Oluwole et al., (2010), who stated that few respondents of their study (14.7%) were married while 85.3% were single <sup>(19)</sup>. As well as these results are in accordance with a study done by Khalil et al., (2014), who showed that 78.0% of university's female students were single and 20.0% of them were married <sup>(20)</sup>.

Lack of awareness among students can affect their wellbeing and their offspring's health. Regarding previous studying the studied topic by the studied students, the present study revealed that the majority of the studied females did not study this topic before. Furthermore, more than one half of the females had any related information about risk factors of congenital malformation. This may be due to the fact that this topic is not included in the studied curriculum in the females' schools. Also lack of student's knowledge may be attributed to insufficient basic information obtained during their formal academic education <sup>(17)</sup>. This highlights the fact that female students are not well prepared to assume their future parenthood role. Abd El-Ghany et al., (2010), reported that 73.0% of students agreed about the inclusions of family life education in schools and university <sup>(21)</sup>.

In addition, the school or university education is not considered the only source for acquiring knowledge or information nowadays. There are other many sources for getting information. Regarding the sources of information of the studied females' students about the risk factors of congenital malformations, our results revealed that relatives were the source of information for more than one third of them, internet for 30% of them, media for more than one quarter of them, books for 16.5% of them and friends for 11.6% of them. This could be explained that the communities with a system of strong

social support as Egyptian community, most of their females specially young age always seek help from relatives rather than medical team. A study done by Mitwally et al., (2000), revealed that the mass media were the main source of information because T.V and net were available in every house beside the students and spent long time for watching it <sup>(22)</sup>.

The source of information can has an obvious effect on the level of awareness regarding specific topic. The results of this study revealed that media and relatives as sources of information for the studied females' students have a positive significant relationship with the level of their awareness. This may be attributed to the fact that relatives have an obvious effect on the knowledge, attitudes and awareness of individuals of the Egyptian community. This could also explained the fact that media and internet plays a very important role in providing information to the public specially adolescents who are mastering using media and internet. So, it is very important to have an organization revising of what uploaded on web site to avoid false and wrong messages. These results are nearly in the line with a study performed by Lawal et al., (2015), who found that the predominant sources of information about birth defects for participants were mass media and doctors / nurses <sup>(23)</sup>. Bener et al., (2006) also found that doctors and the print media were the predominant sources of information about the prevention of birth defects <sup>(24)</sup>.

The importance of mass media as a leading source of information about birth defects is probably attributable to the coverage enjoyed by television, radio and the print media as sources of enlightenment and education for the population. The mass media is also a veritable tool for advertisement of positive behavioral practice such as folic acid intake and discouragement of negative ones that have been implicated in the occurrence of birth defects such as smoking <sup>(11)</sup>.

Regarding the total awareness level among the studied female students related to risk factors of congenital malformations, the total awareness level for more than one half of the studied females was low and it was moderate for more than one quarter of them. This may be due to the absence of designed educational program provided to these students. A study done by Masoumeh et al., (2015), concluded that there is a need for public programs to increase awareness about congenital anomalies to pregnant women and people <sup>(25)</sup>. These results are in contrast with a study performed by Bello et al., (2013), who stated that the participants aged 21-30 years, had the most knowledge of risk factors, also the participant who had high school and university education had the highest score in overall knowledge about the risk factors <sup>(26)</sup>.

The degree of awareness can vary according to the type of information it includes. The results of this study concluded that the highest mean scores of females' awareness regarding risk factors of congenital malformations were related to using drugs during pregnancy, environmental factors, tobacco smoking, exposure to certain substances and nutritional factors. This may attributed to that factors are the advices which are commonly communicated by relatives and media as well as internet which are the common sources of information for the studied female students. While the lowest mean scores of females' awareness were related to the meaning of congenital malformations and its risk factors, probability of discovering congenital malformation during pregnancy, methods of prevention of congenital malformation, antenatal maternal infections and maternal factors. A study done by Masoumeh et al., (2015), found that almost all participants identified alcohol, smoking, maternal infection, maternal age, consanguinity, diabetes, uncertain medications, maternal obesity as risk factors of such problem <sup>(25)</sup>. Another study done by Mohammed et al., (2013), found that the Egyptian mothers knowledge pertinent to factors contributing to congenital anomalies was highlighted that the maximum percentage of them agreed that exposure to infections during pregnancy may resulting in congenital anomalies among fetuses <sup>(27)</sup>. The same explanation was mentioned by Taboo, (2012), who found that reported toxoplasmosis, cytomegalovirus, rubella and herpes virus is among risk factors for congenital anomalies in Mosul city, Iraq <sup>(6)</sup>.

Similarly, Ahmed et al., (2011), concluded that positive consanguinity, family history for congenital anomalies, previous child with a congenital anomaly, consuming drugs during pregnancy, living near industrial source and exposure to infections during pregnancy, were the most common risk factors associated with congenital anomalies. Pregnancy at an early or late age, exposure to radiation and medications misuse during pregnancy were the main causes of congenital anomalies as reported by a relatively high percentages of Egyptian mothers <sup>(28)</sup>.

Finally, many of the complications that could occur during pregnancy and delivery as well as birth outcome could be avoided through health screening and monitoring during prenatal and premarital periods. Promoting the awareness and providing proper knowledge about risk factors and prevention of congenital malformations to premarital females can lead to primary prevention of such serious health problem <sup>(25, 29)</sup>.

## 5. CONCLUSION AND RECOMMENDATIONS

### Conclusion:

Based on the findings of this study, it can be concluded that the total awareness level for risk factors of congenital malformations for more than one half (**52.8 %**) of the studied premarital female students was **low** and it was **moderate** for more than one quarter (**26.4%**) of them. The **highest** mean scores of females' **awareness** were related to using drugs during pregnancy, environmental factors, tobacco smoking, exposure to certain substances and nutritional factors. **The lowest** mean scores of **awareness** of the studied premarital female students were related to meaning of congenital malformation and its risk factors, probability of discovering the congenital malformations during pregnancy, methods of prevention of congenital malformations, antenatal maternal infections, maternal factors and maternal infectious diseases, hereditary factors and exposure of the mother to certain substances during pregnancy.

There was a significant relationship between the age and income of the studied female students and their total level of awareness. There was a positive significant correlation between relatives as a source of females' information and their level of awareness. And there was a positive strong significant correlation between media as a source of females' information and their level of awareness.

### Recommendations:

*Based on the results of this study the following recommendations are suggested:*

- 1- Information about risk factors of congenital malformations should be included in school education curriculum especially secondary and university education.
- 2- Good assessment and evaluation of the health of premarital female adolescents should be emphasized for early detection and intervention of suspected risks.
- 3- Mass media, relatives as well as educational and health care professionals should assume their roles in promoting the healthy behaviors of female adolescents and in improving the community awareness regarding prenatal risk factors.
- 4- Services of premarital counseling should be available and applied for all female university students at least for those who are in the last grades of university education.

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