JHIPH

Original Article

Awareness of Married Adults about Congenital Anomalies in a Rural Village, Assiut

Hala H. Abou Faddan ¥, **Taghreed A.M. Ismail**

Public Health and Community Medicine Department, Assiut University, Egypt

Abstract

Background: Congenital anomalies (CA) are significant causes of infant morbidity, mortality and disability.
Objective(s): To assess the knowledge and attitude regarding congenital anomalies and their associated factors among married adults.
Methods: A community based cross sectional study was conducted on **633** currently married inhabitants in a rural village, Assiut. An interview was used for data collection via a semi-structured questionnaire.
Results: Most participants (96.7%) had ever heard about CA, 20.1% of participants had good knowledge, whereas 73.0% of them had positive attitude. Factors significantly affecting knowledge were family history of CA, educational level, and gender. The same factors were also significantly affecting the attitude towards CA in addition to age.
Conclusion: Only one fifth of participants had good knowledge about CA. Family history of CA, educational level, and gender are significant factors affecting both knowledge and attitude.
Recommendation: To increase the awareness about CA among the public in general and increase the role of health care providers in raising awareness and counseling about CA.

Key words: Awareness, congenital anomalies

INTRODUCTION

Congenital anomalies (CA) are significant causes of infant morbidity, mortality and disability, and its prevalence among neonates ranges from 2%–3%.[1] The prevalence of hereditary genetic disorders among infants and young children in Egypt constitute 2.8% in urban areas in metropolitan governorates while 8.4% in rural areas in Upper Egypt.[2] Congenital anomaly refers to any deformity/ defect, whether genetic or not, which is present at birth.[3] A congenital abnormality may be viewed as a physical, metabolic, or anatomic deviation from healthy   pattern of development that is seen either at birth or diagnosed during the first year of life.[4] Causes of congenital malformations are hereditary (30–40%) or environmental (5–10%). Among hereditary causes; chromosomal abnormality constitutes around 6%, single gene disorders about 25%, and multiple factors constitute 20–30%. In about half of cases, reason is still unknown.[5] Deformities can be divided into broad categories, one being mutations attributed to environmental factors.[6] Infectious agents that cause intrauterine infections can lead to abortion, stillbirth or congenital anomalies.[7,8] Congenital anomalies remain an essential public health problem. Deficient knowledge about the deformities among forthcoming mothers could delay interventions.[9]

The fourth goal of the Millennium Development Goals could be achieved by reduction of congenital anomalies. Proper knowledge about congenital malformation may lead to early diagnosis, effective secondary prevention.[10] Our aim was to assess the knowledge and attitude and their associated factors regarding congenital anomalies among currently married adults in a rural village, Assiut.

METHODS

Study design and setting: A community based cross sectional study was carried out between 1st April to 30th of June, 2015 in Nazlat Baqor Village, Abu Tig District, Assiut Governorate. It lies twenty-four kilometers south to Assiut city. Nazlat Baqor village was selected for the study due to its accessibility (near distance and cooperation of the preventive sector of Abu-Tig health district).
Study population: The target population was currently married adults.
Inclusion criteria: currently married women in reproductive age group who have at least one child and currently married men whose wives are in the reproductive age group and have at least one child.

Sampling technique: The sample size was calculated using EPI info version 7, StatCalc function. The calculated sample size was 279 participants, considering the expected frequency was 76.0% for good knowledge regarding CA [11], with confidence level 95%. According to data available from preventive sector of Abu Tig health district, total number of houses in Nazlat Baqor was 1986. Systemic random sample was taken every 5th house to yield 400 houses. From each house one married female in reproductive age group and one married male whose wife is in the reproductive age (in case of extended families) was randomly selected.

Data collection methods and tools: A semi-structured questionnaire was constructed for personal interviews. The questionnaire consists of three parts.

Part I was about socio-demographic characteristics of participants.

Part II is about knowledge regarding congenital anomalies consisting of 14 questions. A scoring system was developed for knowledge. Each correct response was given score one and wrong responses took zero. The total score ranging from 0-14 was calculated for each respondent. The total score was recoded to a qualitative variable, where good knowledge was considered if the total score was > 50% (> 7) and poor if it was ≤ 50% (0-7). The cut-off point used was similar to that reported by Mohammed et al.[11].

Part III is about assessment of the attitude regarding CA and consists of 10 statements. The response to each statement is based on a three-point Likert scale (agree, neutral and disagree). Agreement with each statement is considered as positive attitude while, disagree is considered as a negative attitude (except for negative statements). Items were scored (2, 1 and 0) respectively; the score was reversed for negative statements (3 out of 10). Total score was calculated which ranged from 0-20. The higher the score, the better the attitude toward congenital anomalies. Furthermore, the quantitative score was recoded into qualitative variable, where high (positive attitude) was considered if the score was > 50% (≥ 11) or low (negative attitude) ≤ 50% (0-10). The cut-off point used was similar to that reported by Sidhu et al.[12]

Validity and reliability of the tools: The data collection tools were submitted to a panel of 5 experts (3 public health and 2 pediatrician) to test the content validity. Some modifications were done to clarify the sentences, test appropriateness and sequences of items. Reliability was tested using Cronbach's Alpha, where it was (0.76) for the knowledge score and 0.68 for the attitude score statements.

Pilot study: Before starting data collection, the questionnaire was pre-tested on a sample of 30 participants (not included in the study) and the required modification in the questionnaire was done. The questionnaire filling time was 15-20 minutes on average. Data collection was done by well-trained data collectors under supervision of the researchers. Independent variables were socio demographic characters as age, sex, education and occupation. Dependent variables were knowledge and attitude regarding congenital anomalies.

Statistical analysis

Data entry and management processes (cleaning, recoding, analysis) was done using Statistical Package for Social Science (SPSS Inc., Chicago, IL, USA). Descriptive statistics were done using frequency & percent for qualitative variables and mean ± SD and range for quantitative variables. Bivariate analysis: comparisons between frequencies was done, Pearson χ^2-test was used for qualitative variables. Non-parametric independent sample Mann-Whitney/ Kruskal-Wallis tests were used to compare scores among two/more groups of independent variables after testing the scores for normality. Spearman correlation was done to measure association between knowledge and attitude scores. Multivariate regression analysis was done to determine factors affecting knowledge and attitude towards CA. Level of significance was considered when p- value was < 0.05 and 95% confidence interval.

Ethical considerations

All ethical issues related to research were addressed according to the Ethics guidelines of standard research. At first, formal administrative approvals were obtained. These approvals included those obtained from the Ethical Review Committee of Assiut Faculty of Medicine and the Directorate of Health. Each participant was given a full explanation of the study objectives before enrollment. Participants were assured of the confidentiality of their responses. Informed consent was taken. Anonymity and confidentiality of collected information was ensured.

RESULTS

Table (1) shows that females represented 58.5% of the studied group. The mean age was 34.1±9.7 years. Illiterates represented 67.1%, housewives represented 56.1%. Consanguineous marriage was reported among 51.1%, age at marriage was 18.2±2.7 among females and 29.2±6.4 among males. Family history of congenital anomalies was reported among 29.1%. The clear majority of respondents had ever heard about CA (96.7%). Of them, more than half mentioned consanguinity and old age at pregnancy (55.9% & 53.9% respectively) as risk factors for CA. Mother age above forty was reported as a risky age of pregnancy by 63.9%. Regarding knowledge about possibility of intrauterine diagnosis, availability of premarital

counseling services, religious fatwa about abortion in some types of CA and preventive role of MMR vaccine were reported by 65.0%, 70.6%, 69.9% and 68.6% of participants respectively. As regards source of information mass media and relatives represented the highest percent (79.6% and 45.9% respectively). Schools were the information source among only about one fifth of the study group (21.4%) (Table 2).

Table (1): Socio-demographic characteristics of married adults, Assiut, 2015.

Characteristics	Participants No.	(n= 633) %
Gender:		
Males	263	41.5
Females	370	58.5
Age: (mean ±SD)	34.1±9.7 years	
≤ 30 years	275	43.4
> 30 years	358	56.6
Educational level:		
Illiterate	425	67.1
Basic education	29	4.6
Secondary education	146	23.1
University education	33	5.2
Occupation:		
Worker	92	14.5
Skilled worker	64	10.1
Farmer	52	8.2
Employee	39	6.2
Professional	31	4.9
Housewife	355	56.1
Consanguinity:		
No consanguinity	310	49.0
1st degree consanguinity	191	30.2
Higher degree consanguinity	132	20.9
Age at marriage: (mean ± SD)		
Males	29.2±6.4 (17 – 47)	
Females	18.2±2.7 (13 – 30)	
Family history of congenital anomalies:		
Yes	184	29.1
No/don't know	449	70.9

Table (2): Knowledge about congenital anomalies among married adults, Assiut, 2015

| Variable	Participants No.	(n= 633) %
Ever heard/knew about congenital anomalies:	612	96.7
***Risk factors of congenital anomalies**:	(n= 612)	
Consanguinity	342	55.9
Old age at pregnancy	330	53.9
Drugs at early pregnancy	180	29.4
Exposures to chemicals / radiation during pregnancy	49	8.0
Viral diseases during pregnancy	39	6.4
Diseases transmitted from cats /dogs	32	5.2
Nutritional deficiencies	4	0.7
* **Risky age of pregnancy to the mother:**	(n= 612)	
Above 40 years	391	63.9
Less than 20years	61	10.0
20-40 years	47	7.7
Don't know	141	23.0
Knowledge about possibility of intrauterine diagnosis	398	65.0
Knowledge about availability of premarital counseling services	432	70.6
Knowledge about religious fatwa about abortion in some types of CA	428	69.9
Knowledge about preventive role of MMR vaccine	420	68.6
***Source of information:**	(n= 612)	
Mass media	487	79.6
Relative	281	45.9
School	131	21.4
Health facility	86	14.1
Friends	46	7.5
Newspapers/magazines	28	4.6

*multiple response questions

Table (3) shows that 65.9% agree about relation between pregnancy age and CA and 57.7% agree that old mother age is related to CA whereas 80.1% disagree about relation between paternal age and CA. Still there is a higher percent agree with consanguineous marriage than those who disagree (47.2% versus 39.8%). Moreover 35.7% agree regarding consanguineous marriage among their siblings versus 20.9% who disagree. More than half of the study group (54.5%) agree with medical and genetic screening to exclude the possibility of CA whereas 80.9% agree about seeking special consultant medical advice in case of positive risk factors to CA.

The preventive role of folic acid and vitamin B12 in preventing CA was agreed upon by 49.1% whereas 43.9% agree about increased awareness of the community about CA. Among those who had attitude towards increased awareness about CA, 37.1% and 34.5% agree that persons with genetic diseases and premarital age respectively are those who need more awareness while the whole community members was mentioned by 25.9% as a target for increased awareness. Regarding the information required, management procedures and preventive methods were the most commonly required information (51.8% & 48.9% respectively) (Figure 1).

Table (3): Attitude towards congenital anomalies among married adults, Assiut, 2015

Statements	Participants (n= 633)		
	Agree N (%)	Neutral N (%)	Disagree N (%)
Attitude regarding relation between pregnancy age and CA	417 (65.9)	0 (0.0)	216 (34.1)
Attitude toward old mother age at pregnancy (above 35 years) and CA.	365 (57.7)	216 (34.1)	52 (8.2)
Attitude regarding relation between paternal age and CA*	126 (19.9)	0 (0.0)	507 (80.1)
Attitude toward consanguinity*	299 (47.2)	82 (13.0)	252 (39.8)
Attitude toward relation between consanguinity and CA	275 (43.4)	226 (35.7)	132 (20.9)
Attitude toward consanguineous marriage among siblings*	226 (35.7)	275 (43.4)	132 (20.9)
Attitude towards medical and genetic screening to exclude the possibility of CA	345 (54.5)	199 (31.4)	89 (14.1)
Attitude towards the preventive role of folic acid and vitamin B12 regarding CA	311 (49.1)	188 (29.7)	134 (21.2)
Attitude towards seeking special consultant medical advice in case of positive risk factors to CA	512 (80.9)	105 (16.6)	16 (2.5)
Attitude towards increased awareness of the community about CA	278 (43.9)	307 (48.5)	48 (7.6)

*reversed statements.
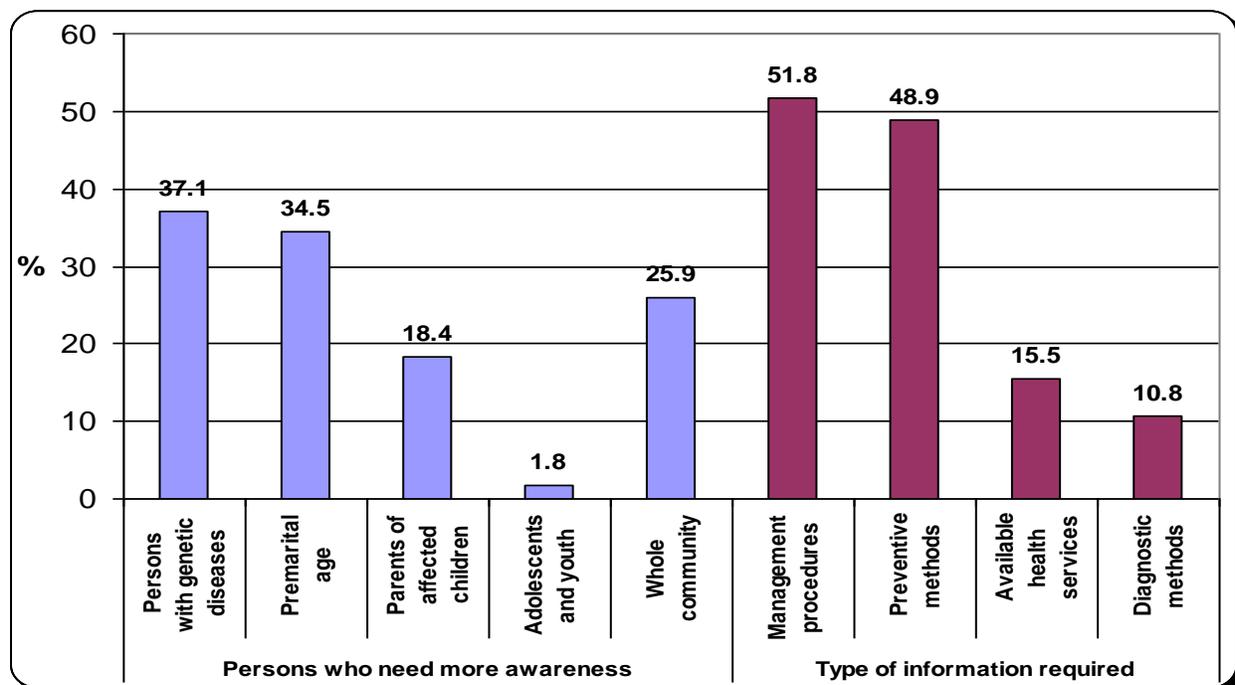
Figure (1): Persons who need more awareness and the type of information required regarding congenital anomalies as mentioned by married adults, Assiut, 2015

Table (4) shows that 20.1% of participants had good knowledge level versus 79.9% whose knowledge level was poor. Knowledge was significantly higher among males more than females (25.1% versus 16.5% respectively). Respondents who have university education had significantly higher knowledge level (42.4%). Regarding occupation, professionals had the highest knowledge level (48.4%) while housewives and farmers had the lowest (16.3% & 7.7% respectively). Respondents with family history of CA had significantly higher knowledge (38.6%). Younger people had higher knowledge level (23.3%) but the difference was statistically insignificant. The mean knowledge score was significantly higher among more educated (secondary and university education), professionals and those with family history of CA. Younger age had significantly higher attitude towards CA (80.0%). Regarding educational level, respondents with university and secondary education had the highest percent of positive attitude (90.9% and 81.5% respectively) with statistical significant difference. Respondents with family history to congenital anomalies showed significantly higher attitude (82.1%). The mean attitude score was significantly higher among females, younger age group (< 30 years), more educated (secondary and university

education) and both professionals and housewives. (Table 5). The attitude score is positively correlated to knowledge score with high statistical significant difference (Figure 2). Table (6) shows that the significant factors affecting good knowledge were family history of CA, high educational level, and male gender (OR 6.7, 1.4, and 2.3 respectively), whereas the significant factors affecting positive attitude were family history of CA, female gender, high educational level and young age (OR 3.3, 2.5, 1.2 and 1.6 respectively).About half of the female participants had exposed to home smoke during their last pregnancy, whereas near one third (31.9%) had animals (dogs &cats) at home and chronic diseases were reported among about one fourth (23.5%) of the participants (Figure 3). There was no difference in knowledge level regarding exposure to risk factors whereas among the exposed women, negative attitude was significantly higher (75.8%, p = 0.04) (Figure 4). The present study revealed that 5.1% of married adults had a child with CA, about three quarters (73.7%) of the affected children were males. Regarding the types of CA reported; 47.4% were deaf mute, 36.8% were mentally retarded, 10.5% had congenital eye diseases, and 5.3% had hydrocephalus. Moreover, 26.3% of those children had died.

Table (4): Knowledge according to socio demographic characteristics of the married adults, Assiut, 2015

| Variable	Good knowledge		Poor knowledge		P-value*	Knowledge score	P-value**
	N=127	20.1%	N=506	79.9%		5.3±2.3 (0-10)	
Gender:							
Males	66	25.1	197	74.9	**0.008**	5.4±2.5	0.07
Females	61	16.5	309	83.5		5.2±2.2	
Age group:							
≤ 30 years	64	23.3	211	76.7	0.07	5.4±2.2	0.09
> 30 years	63	17.6	295	82.4		5.2±2.3	
Educational level:							
Illiterate	54	12.7	371	87.3		4.8±2.2	
Basic education	10	34.5	19	65.5	**<0.0001**	5.8±2.4	**<0.0001**
Secondary education	49	33.6	97	66.4		6.2±2.2	
University education	14	42.4	19	57.6		7.1±1.6	
Occupation:							
Professional	15	48.4	16	51.6		6.9±1.9	
Employee	12	30.8	27	69.2		5.7±2.7	
Skilled worker	15	23.4	49	76.6	**<0.0001**	5.3±2.6	**<0.0001**
Worker	23	25.0	69	75.0		5.8±2.1	
Farmer	4	7.7	48	92.3		3.8±2.2	
Housewife	58	16.3	297	83.7		5.3±2.3	
Family history of CA:							
Yes	71	38.6	113	61.4	**<0.0001**	6.7±1.7	**<0.0001**
No/ Don't Know	56	12.5	393	87.5		4.7±2.2	
Consanguinity:							
Yes	69	21.4	254	78.6	0.4	5.2±2.3	0.3
No	58	18.7	252	81.3		5.4±2.3	

* Pearson Chi-square test   ** Non-parametric independent sample Mann-Whitney/ Kruskal-Wallis tests

Table (5): Attitude according to sociodemographic characteristics of the married adults, Assiut, 2015

| Variable	Positive attitude		Negative attitude		P-value	Attitude score	P-value
	N 462	73.0%	N 171	27.0%		11.5±3.2 (4-18)	
Gender:							
Males	183	69.6	80	30.4	0.1	10.8±2.6	**<0.0001**
Females	279	75.4	91	24.6		12.0±3.4	
Age group:							
≤ 30 years	220	80.0	55	20.0	**<0.0001**	12.2±3.2	**<0.0001**
> 30 years	242	67.6	116	32.4		11.0±3.0	
Educational level:							
Illiterate	293	68.9	132	31.1		11.1±3.2	
Basic education	20	69.0	9	31.0	0.002	11.8±3.7	**<0.0001**
Secondary education	119	81.5	27	18.5		12.4±3.0	
University education	30	90.9	3	9.1		12.7±2.2	
Occupation:							
Professional	27	87.1	4	12.9		12.2±2.3	
Employee	26	66.7	13	33.3		10.9±3.1	
Skilled worker	46	71.9	18	28.1	0.01	11.1±2.5	**<0.0001**
worker	70	76.1	22	23.9		11.1±2.1	
Farmer	28	53.8	24	46.2		9.8±3.0	
Housewife	265	74.6	90	25.4		12.0±3.4	
Family history of CA:							
Yes	151	82.1	33	17.9	**0.001**	11.8±2.5	**0.09**
No/ Don't know	311	69.3	138	30.7		11.4±3.4	
Consanguinity:							
Yes	229	70.9	94	29.1	0.2	11.3±3.1	0.3
No	233	75.2	77	24.8		11.7±3.2	

* Pearson Chi-square test   ** Non-parametric independent sample Mann-Whitney/ Kruskal-Wallis tests
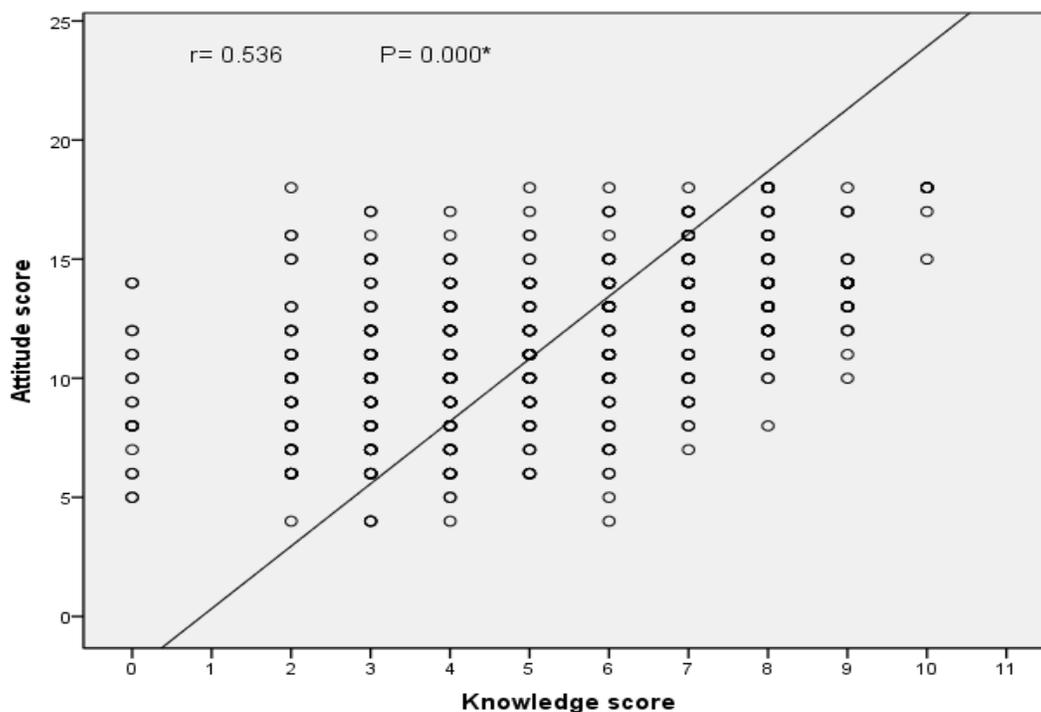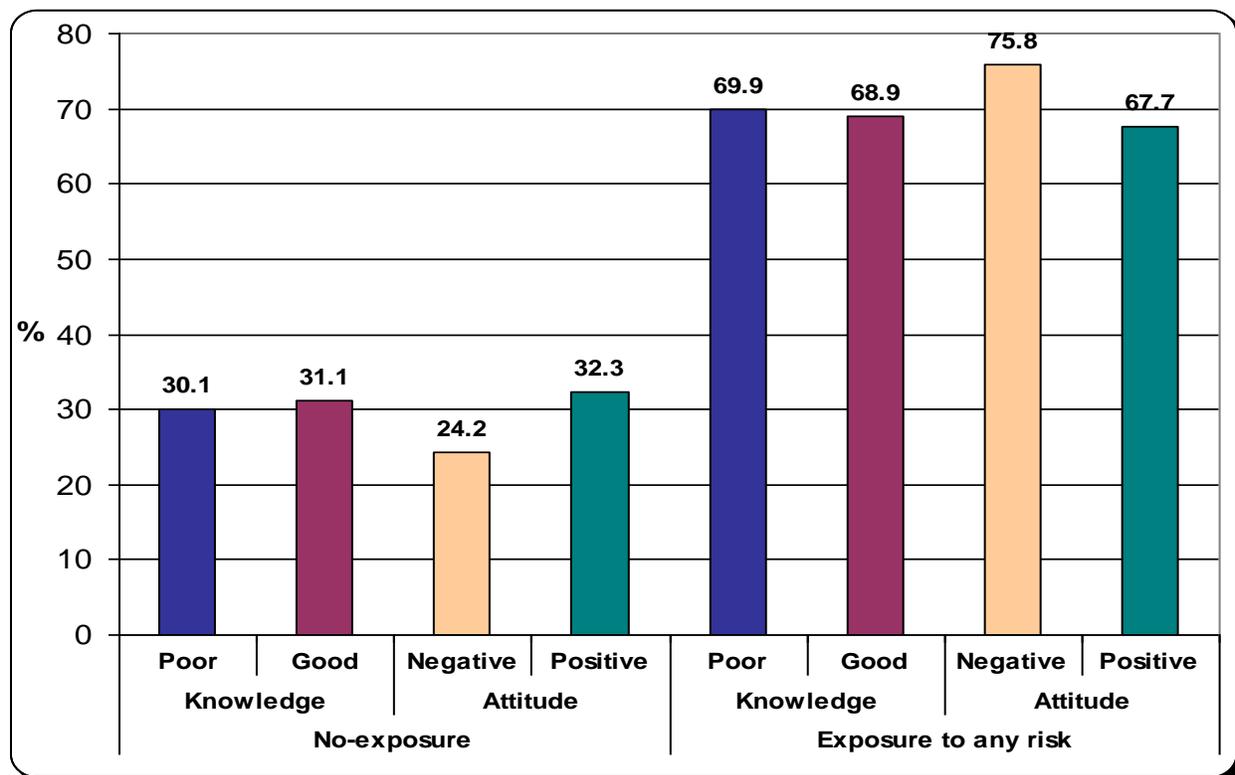

Figure (2): Correlation between knowledge and attitude scores among married adults, Assiut, 2015

Table (6): Multivariate analysis of factors affecting knowledge and attitude among married adults, Assiut, 2015

		B	S.E.	Wald	df	Sig.	Exp(B)
Age	Knowledge	-0.251	0.232	1.170	1	0.3	1.3
	Attitude	-0.454	0.206	4.874	1	0.03	1.6
Education	Knowledge	0.301	0.073	17.008	1	<0.0001	1.4
	Attitude	0.180	0.077	5.401	1	0.02	1.2
Occupation	Knowledge	-0.017	0.052	0.104	1	0.8	0.9
	Attitude	0.011	0.044	0.061	1	0.8	1.0
Consanguinity	Knowledge	-0.170	0.108	2.468	1	0.1	0.8
	Attitude	0.085	0.093	0.826	1	0.4	1.1
Family history	Knowledge	1.905	0.337	31.969	1	<0.0001	6.7
	Attitude	1.188	0.286	17.252	1	<0.0001	3.3
Gender	Knowledge	0.835	0.362	5.310	1	0.02	2.3
	Attitude	0.897	0.275	10.674	1	0.001	2.5
Constant	Knowledge	-3.296	0.958	11.839	1	0.001	.03
	Attitude	-0.536	0.777	0.476	1	0.490	0.585
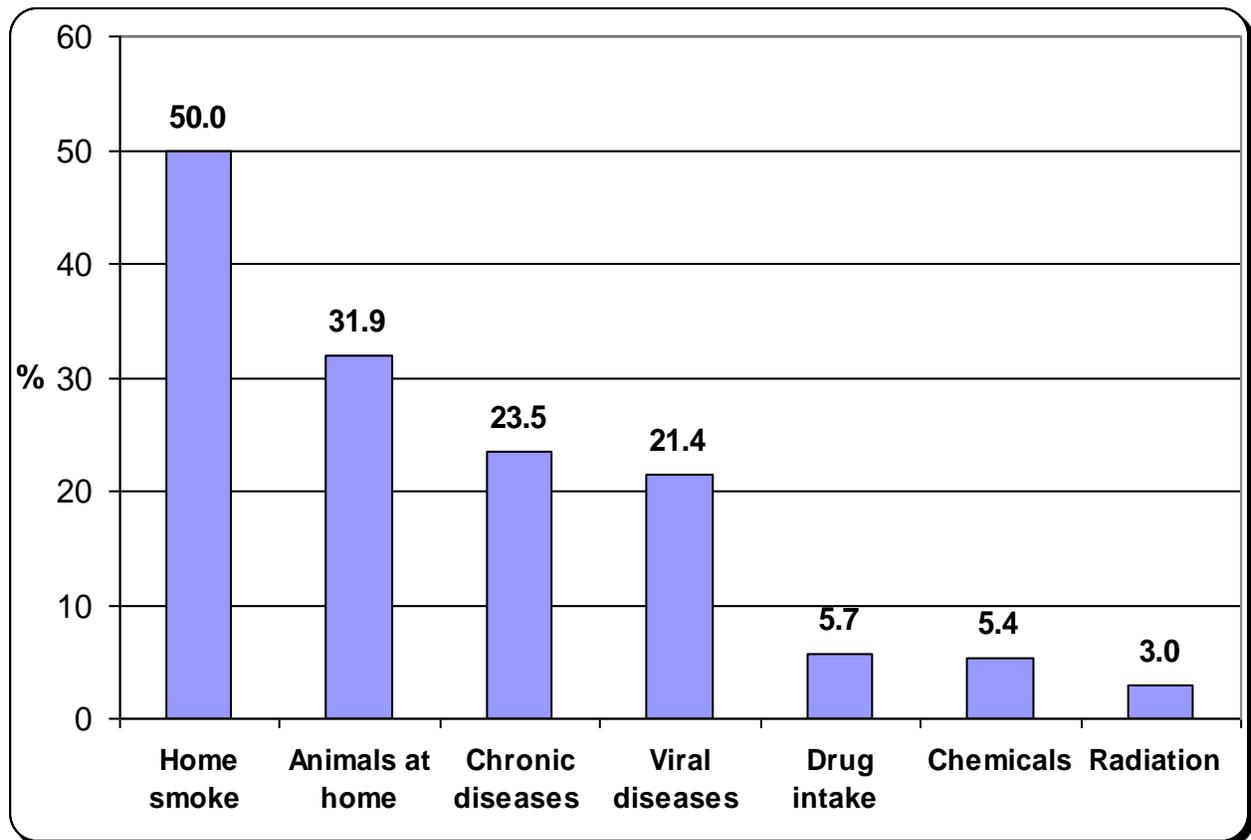
Figure (3): Exposure to risk factors during last pregnancy among female participants, Assiut, 2015

104

Journal of High Institute of Public Health 2018;48(2):97-106.

Figure (4): Relation between exposure to risk factors and knowledge and attitude among female participants, Assiut, 2015

DISCUSSION

In the present study, the vast majority of the studied group had ever heard about CA. Mass media and relatives were the most common sources of knowledge while the role of medical personnel was limited. From this finding appears the importance of the mass media as a leading source of information and this is probably attributable to their popularity among our population, thus they can be used as a genuine tool for advertisement of positive behaviors. Moreover, Youssef et al.[13] reported much lower role for mass media but higher role for the medical personnel. This study reported that most of studied participants had knowledge about premarital counseling. This finding agrees with Sylvia et al. [14], while these results are much higher than the finding reported by Youssef et al.[13] As regards the risk factors for CA as mentioned by participants, consanguinity was identified by 55.9% of the participants. Other studies reported much higher percent for declaring consanguinity as one of the most common contributing factors in transferring genetic malformations.[10, 11] In the present study, old age at pregnancy, drug misuse at early pregnancy and exposure to chemicals/radiation were identified by

participants as risk factors for CA. The same were reported in several studies.[9-11] Our results reported that viral infections during pregnancy were mentioned as a risk factor for CA by participants. The same was recorded by some studies.[10, 11] However, good knowledge was reported among 20.1% of participants in the present study whereas much higher level of knowledge was reported by other studies.[9, 11] This may be due to different socio-demographic characteristics of study participants (illiterate rural residents). On the other hand, Sidhu et al.[12] reported that only 4.5% of their participants had good knowledge regarding congenital malformations.

As regards factors affecting knowledge, good knowledge was significantly associated with higher education. This is confirmed by many other studies.[10-12,15-17] While this study revealed insignificant association between knowledge about CA and age of participants, the same was reported by Bello et al. [9], still the younger age group of participants had better knowledge, the same was reported in several studies.[10,11,17] Concerning the occupation, unfortunately housewives reported one of the lowest knowledge in the present study. The same finding was reported by Mohammed et al.[11]. On the

other hand, respondents with professional occupation had the highest knowledge. This was confirmed by Lawal et al. [17] In the present study, logistic regression analysis revealed that the predictors of satisfactory knowledge level were higher educational level, having a family history of CA and male gender. In rural area, males had better educational levels than females. In addition, most of females were housewives. Regarding the attitude, the present study reported a very high positive attitude (80.9%) towards seeking special consultant medical advice in case of positive risk factors to CA. The same finding was reported by [13]. In our study, 43.4% agreed about the relation between consanguinity and CA. Mohammed et al. [11] in their study reported much higher percent of agreement. The present study reported positive attitude towards CA among 73.0% of the participants. The same finding was reported by Sidhu et al.[12] On the contrary, Mohammed et al.[11] reported that 77% of Egyptian and 72% of Saudi mothers expressed negative attitude.

Regarding the factors affecting the attitude, younger participants (≤ 30 years) showed higher attitude towards screening of CA. This finding could be attributed to younger age had better education and knowledge about CA. On the contrary, Youssef et al.[13] reported that older age group had better attitude toward screening about CA. The study revealed that higher educational level was associated with positive attitude. On the same line were the results of two earlier studies.[11,13] Consanguinity was insignificantly associated with respondent's attitude. The same was reported by Youssef et al.[13]. Our result revealed that in spite of poor knowledge of housewives regarding CA, they showed positive attitude. The contrary was reported by Youssef et al. [13]

The present study revealed that family history of CA was significantly associated with positive attitude, whereas Youssef et al.[13] reported insignificant difference. Moreover, the present study revealed significant positive correlation between the knowledge and attitude level. This result was in line with previous studies.[12,18] In addition, the present study revealed that most of affected children with congenital anomalies were males. This finding is consistent with many studies.[11,19, 20]

CONCLUSIONS & RECOMMENDATIONS

It was concluded that one fifth of participants had good knowledge, whereas about three quarters had positive attitude regarding CA. Attitude score was positively correlated to knowledge score. Family history of CA, educational level, and gender were significant factors affecting knowledge and attitude.

The present study recommends increasing awareness about CA among the public in general via health education programs and increasing the role of health care providers in raising awareness and counseling thus improve all levels of prevention (early detection and proper management).

Conflict of Interest: None to declare.

REFERENCES

1. Kalter H, Warkany J. Congenital malformations. Etiologic factors and their role in prevention (first of two parts). New England Journal of Medicine. 1983; 308(8):424–31.

2. Abd-Al Raouf R. Genetic services in Egypt: current situation and needs assessment [dissertation]. Cairo: Institute of Postgraduate Childhood Studies, Ain Shams University; 2008.

3. Turnpenny P, Ellard S, Emery S. Elements of Medical Genetics. 12th ed. Edinburgh: Elsevier-Churchill Livingstone; 2005.

4. Schroeder H. Congenital anomalies. Available at www.healthline.com, accessed on 23/8/2013.

5. Rajangam S, Devi R. Consanguinity and chromosomal abnormality in mental retardation and or multiple congenital anomalies. J Anat Soc India. 2007; 56: 30-3.

6. Sawardekar KP. Profile of major congenital malformations at Nizwa Hospital, Oman: 10-year review. Journal of Pediatrics and Child Health. 2005; 41:323–30.

7. Klein JO, Remington JS. Infectious diseases of the fetus and newborn infant. 3rd ed. Philadelphia: Saunders1990; 1–14.

8. Demmler GJ. Summary of a workshop on surveillance for congenital CMV diseases. Review of Infectious Diseases.1993; 29:313–5

9. Bello A, Acquah A, Quartey J, Hughton A. Knowledge of pregnant women about birth defects. BMC Pregnancy Childbirth. 2013; 13: 45.

10. Masoumeh P, Vahid K, Hamid AM, Khosheh K, Samira K. Knowledge of pregnant women about congenital anomalies: A cross-sectional study in north of Iran. Indian J Health Sci Biomed Res [serial online] 2015; 8(1): 41-7.

11. Mohammed A, Mohammed S, Abdul-Fattah A. Congenital anomalies among children: Knowledge and attitude of Egyptian and Saudi mothers. Journal of Biology, Agriculture and Healthcare. 2013; l3 (20): 18-31.

12. Sidhu G, Kaur H, Kaur I, Kaur J. Knowledge and Attitude regarding Congenital Malformations among Married Women. Asian J. Nur. Edu. and Research. 2017; 7(3): 379-83.

13. Youssef R, El-Weshahi H, Ashry M. Knowledge, attitudes and beliefs of women in the reproductive age towards prenatal screening for congenital

malformations, Alexandria-Egypt. Int J Reprod Contracept Obstet Gynecol. 2017; 6 (5):1707-12.

14. Sylvia SN, Lin Wai Chan, William WK. Pregnant women's attitudes to and knowledge of non-invasive prenatal testing in Down syndrome screening in Hong Kong. HKJGOM. 2014;14(1): 43-50.

15. Dahl K, Hvidman L, Jørgensen FS, Henriques C, Olesen F, Kjaergaard H, et al. First-trimester Down syndrome screening: Pregnant women's knowledge. Ultrasound Obstet Gynecol 2011; 38:145-51.

16. Al-Jader LN, Parry Langdon N, Smith RJ. Survey of attitudes of pregnant women towards Down syndrome screening. Prenat Diagn, 2000; 20:23-9.

17. Lawal T, Yusus O, Fatiregun A. Knowledge of birth defects among nursing mothers in a developing country. Afr Health Sci. 2015; 15(1): 180–7.

18. Alnujaim H, Albedaie S, Alyahya S, Adosary A, Alotaibi1 F, Alnujaim H, et al. Awareness, knowledge and attitudes of Saudi pregnant women towards cleft lip and palate. Curr Pediatr Res 2017; 21(4): 595-603.

19. Othman, G. The Prevalence and types of congenital anomalies in newborn in Erbel, Iraq. Medical Journal of Islamic World Academy of Sciences 2013; 21(1): 31- 4.

20. Shawky R, Sadik D. Congenital malformations prevalence among Egyptian children and associated risk factors. The Egyptian Journal of Medical Human Genetics; 2011; 12: 69-78.