

## ORIGINAL RESEARCH

# Educational program about Rubella among pregnant women attending antenatal clinic in Women's Health Hospital, Assiut University, Egypt

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## ABSTRACT

**Background and objective:** Rubella or German measles is infectious disease that affects both child and adult, but when associated with pregnancy, especially in first trimester, fetus can be exposed to various problems as abortion, multiple birth defects, and congenital rubella syndrome (CRS). This study aimed to assess awareness of pregnant women about rubella and to identify the impact of an educational program about rubella for pregnant women attending antenatal outpatient clinic in Women's Health Hospital, Assiut University, Egypt.

**Methods:** Quasi-experimental research design was carried out included 300 pregnant women in their first trimester. Direct interview using a semi-structured questionnaire which involved two parts: part (1) included personal data, family, and medical history, and part (2) involved questions directed to pregnant women to assess their knowledge about rubella. An educational program was applied on women as an intervention by session meeting classes. The data of knowledge were collected after the intervention then analyzed.

**Results:** More than one third (38%) of the studied pregnant women were 25-30 years. The mean score of knowledge regarding rubella among pregnant women was  $5.83 \pm 2.48$  in the pretest which improved significantly in the posttest to  $20.07 \pm 1.86$ .

**Conclusions and recommendations:** The results revealed lack of awareness regarding rubella among studied women which increased after the application of the educational program. It is important to increase the availability of antenatal care services and provide adequate counseling for women before pregnancy about Rubella infection.

**Key Words:** Educational program, Rubella, Pregnant women, Egypt

## 1. INTRODUCTION

Rubella is considering a public health importance because of its teratogenic effect on the fetus if the woman is infected in early pregnancy or just before conception.<sup>[1]</sup> Rubella can be transmitted by droplets, contact with nose or throat secretions of an infected person, it has an incubation period of 12 to 23 days.<sup>[2]</sup> It can transmit to growing fetus through placenta.<sup>[3]</sup> Patient with Rubella complain of high temperature,

malaise in prodromal stage after that by one to two days a maculopapular rash can be appear. This rash appears first in the face and spread to the trunk and limbs, it can persist for three days and may be appear after lymphadenopathy which can persist for 15 days after disappearance of rash.<sup>[4]</sup> Rubella can cause a major risk when occurred in pregnant women, especially in the first four months of pregnancy; it carries serious neonatal outcomes<sup>[5]</sup> which includes all consequences

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of the intrauterine rubella infection as miscarriage, stillbirth, or birth defects.<sup>[6]</sup>

Congenital rubella syndrome includes loss of hearing, neurologic problems, enlargement of liver and spleen, congenital heart defects, eye's problems as glaucoma, and intrauterine growth retardation.<sup>[7]</sup> According to WHO estimation, CRS cases account 110,000 worldwide per year. It is reported that 51%-69.2% of preschool children from 6 months to 5 years age, also infected children can transmit the virus to pregnant women and this can lead to increasing CRS risk.<sup>[5]</sup> It is important to prevent rubella infection among child bearing age women to reduce rubella complication through; raising awareness among women about CRS, ante natal care program and vaccination.<sup>[8]</sup>

In Egypt, the MOH has play protective role in decreasing the load of infectious diseases through the Expanded Program of Immunization (EPI) which begin in 1988. In 1999, rubella vaccine was integrated in the MOH EPI combined with measles and mumps (MMR) for children at age of 18 months. Also, MMR vaccine was given to school children at the age of school entry (6 years) in year 2001 and for three successive years. Moreover, the campaign those started in 2001 targeted school children only and not reach to non-school children or absentees. Also, children in private schools may be vaccinated or not. Consequently, it is expected that more than 15% of children aged 6-10 years of age are not protected against rubella and it is possible that rubella persists for some years among this age group.<sup>[9]</sup>

The current study aimed to assess knowledge pregnant women attending antenatal outpatient clinic at Women's Health Hospital, Assiut University about rubella, to improve their knowledge for further pregnancy and evaluate impact of an educational program about rubella among them.

### Significance of the study

Prevention of rubella and their complications during pregnancy are possible through raising awareness among pregnant women on rubella and the importance of antenatal care. Rubella is a major health problem that carries a serious change on fetus when the mother exposure to this virus especially just before conception or in early pregnancy. This can increase risk of transmission of rubella to fetus by 90% and later cause a complex of problems to the fetus. That involves miscarriage, still birth and severe defects as heart, hearing or eye defect.<sup>[8]</sup>

A study performed on Japanese women to assess their knowledge about maternal child infection and rubella infection, this study found that their information regarding maternal child infection were low. And recommend educational program

and counseling to increase their awareness and decrease occurrence infection among them.<sup>[10]</sup> To prevent rubella should be reaching to vaccination coverage, so knowledge and awareness about rubella is important part to fulfill this gap and this can achieved through educational program about rubella for pregnant women.<sup>[11]</sup>

## 2. SUBJECTS AND METHODS

### 2.1 Study design

The design of the study was quasi experimental design.

### 2.2 Setting

This study was conducted at antenatal outpatient clinic of Woman's Health Hospital, Assiut University, Egypt.

### 2.3 Sampling technique

Studied population was 300 pregnant women who attend antenatal clinic. The data was collected on two day/week which this days randomly chosen. Total coverage for all pregnant women in first trimester was recruited to participate in this study.

### 2.4 Tools of the study

An interview questionnaire was designed by researchers. It composed of two portions:

*Portion one:* Inclusive personal data like age, occupation, educational level and residence, family history for rubella and medical history of studied women.

*Portion two:* It included questions regarding knowledge about rubella used to assess knowledge level before application of the educational program such as definition of rubella, signs and symptoms, modes of transmission, etc. Answers of these questions were assessed and evaluated immediately after application of the educational program through posttest. The researchers prepared brochures which included the needed information regarding rubella which were distributed for the participants after finishing instructional course.

A scoring system was designed for the assessment of pregnant women knowledge contains of 13 questions; a score of 1 was given for each.

### 2.5 Reliability of a tool

The internal consistency of the responses for each scale and the entire instrument were determined by the Cronbach  $\alpha$  coefficient that was 0.840.<sup>[12]</sup>

### 2.6 Validity of questionnaire

Questionnaire was examined and reappraised by a group of specialists in the field of Obstetrics & Gynecological & Com-

munity Health Nursing and Public Medicine staff at Assiut University who reviewed the instruments for clarity, relevance, comprehensiveness, understanding and applicability.

## 2.7 The instructional schedule

It had been designed by researchers depending on the pertinent literary text. The goal of this schedule is to enhance pregnant women awareness about rubella (see Table 1).

**Table 1.** Sessions given to pregnant women

Sessions	Content	Teaching methods	Media	Time	Evaluation
Session	<ul style="list-style-type: none"> <li>● Guidance of the pregnant women, interpret the goal and reality of the work for them</li> <li>● Inform the pregnant women by instructional plan</li> <li>● Pretest was performed</li> <li>● Introduction about rubella virus</li> <li>● Definition, signs and symptoms incubation period and mode of transmission, complications of rubella (congenital rubella syndrome)</li> <li>● Prevention of rubella virus</li> <li>● Posttest was done</li> </ul>	<ul style="list-style-type: none"> <li>-Lecture</li> <li>-Group discussion</li> </ul>	<ul style="list-style-type: none"> <li>Handout</li> <li>Flip chart</li> </ul>	60 minutes for each researcher	<ul style="list-style-type: none"> <li>-Women get involved in discussion during meeting</li> <li>-Post-test</li> </ul>

**I-Preparing stage:** Investigators designed educational plan to promote women's awareness, it depends on pre-test to evaluate participants' information about rubella, and then that the schedule and the instructional instruments were developed.

**II-Regulating stage:** This stage involved the organization for achieving the program as: preparing the place of lecture, meeting, brochure, etc. The study sample was divided into 60 groups in a variety of numbers ranged between 4-5 women in each group according to the numbers of sample size.

*Teaching place:* Program conducted at antenatal clinic.

*Time of meeting:* The determined based on convenient time of a participant and the coordination between the investigators and pregnant women.

*Teaching techniques and substances:* The investigators used plain teaching styles like: lecture, group discussion. The media handouts regarding rubella were designed by the investigators and given to all participants after finishing the instructional plan.

*Lecture:* Introduction about rubella, definition, signs and symptoms, mode of transmission, and complications of rubella and post-test was done.

**III-Implementation stage:** Educational program was conducted in three months every group take one session for one hour to complete the program content; and finally after completed the program content followed by an immediate posttest.

**IV-Evaluation stage:** The evaluation was done through posttest which done immediately after implementing and completing the course to assess participants' knowledge. Af-

ter that, pregnant women were given brochure contained main information about rubella.

## 2.8 Working area

During meeting, the investigators inform pregnant women by themselves then illustrate the goal of the work. Pretest was done before applying the meeting to evaluate the participants' information. In conclusion, posttest was performed to value the acquired information after finishing educational meeting. This schedule performed in duration from the first of February 2017, till end of August 2017.

**I-Administrative phase:** An official letter approval was gained from the Dean of the Faculty of Nursing, Assiut University and directed to the manager of Women Health Hospital to complete the study. The letter included a permission to carry out the study.

**II-Pilot study:** It was carried out before starting of data collection on 30 mothers which were excluded from the total study sample due to modifications done in the questionnaire. The aim at this study was to test the clarity of the tools and to estimate the required time to fill the questionnaire which excluded from the study.

## 2.9 Ethical issues

- Study suggestion was confirmed from ethical committee in the Faculty of Nursing, Assiut University.
- No danger was found during implementation of the study.
- This study was following general moral concepts in clinical study.
- Written consent gained from pregnant women that

were willing to share in the study after clarifying the reality and goal of the study.

- Privacy and anonymity was confirmed.
- Research participant had the choice to reject to join or dropped out from the research at any time they want and in the absence of any reason.
- Study participant singularity was taken in consideration during data collection.

**2.10 Statistical analysis**

Date entry and data analysis were done using SPSS version 19 (Statistical Package for Social Science). Data were presented as mean and standard deviation. Chi-square and Fisher Exact tests were designed to differentiate between qualitative elements. Mann-Whitney test was used to contrast quantitative elements between two groups and Kruskal Wallis Test for more than two groups in case of non-parametric data. Wilcoxon Signed Rank Test was done to compare quantitative variables between pre-test and post-test. *p*-value considered statistically significant when *p* < .05.

**3. RESULTS**

Table 2 shows that more than one third (38%) of pregnant women were 25-30 years with a mean of age 27.75 ± 5.79 years. The vast majority 95.3% of women were house wife. Moreover, 77.3% of women were from rural area. Illiterate women represented 31.3% of them.

Regarding Table 3 family history for rubella virus, only 2.3% of women had history of rubella in their family and 0.7% of sample exposure to rubella during previous pregnancy which this virus leads to abortion. But, 1% of pregnant women exposed to rubella during current pregnancy.

**Table 2.** Personal characteristics of the studied pregnant women

Personal characteristics	No. (n = 300)	%
<b>Age (years)</b>		
< 25	96	32.0
25-30	114	38.0
> 30	90	30.0
Mean ± SD (Range)	27.75 ± 5.79 (16.0-42.0)	
<b>Occupation</b>		
House wife	286	95.3
Employer	14	4.7
<b>Residence</b>		
Urban	68	22.7
Rural area	232	77.3
<b>Education</b>		
Illiterate	94	31.3
Read and write	38	12.7
Primary and elementary	58	19.3
Secondary	76	25.3
University	34	11.3
<b>Duration of pregnancy</b>		
First 8 wk.	76	25.3
8 to 12 wk.	224	74.7

**Table 3.** Distribution of studied women regarding family history for rubella

Variables	No. (n = 300)	%
<b>Family history for rubella virus</b>		
Yes	7	2.3
No	293	97.7
<b>Complications of rubella occurred to them</b>		
None	3	42.9
Arthritis or arthralgia, often affecting the fingers, wrists and knees	3	42.9
Congenital Rubella Syndrome	1	14.3
<b>Exposure to rubella during previous pregnancy</b>		
Yes	2	0.7
No	298	99.3
<b>Complications of rubella occurred to fetus</b>		
Abortion	2	100.0
<b>Family member exposure to rubella during pregnancy</b>		
Yes	2	0.7
No	298	99.3
<b>Complications of rubella occurred to fetus</b>		
Abortion	2	100.0
<b>Rubella attack during current pregnancy</b>		
Yes	3	1.0
No	297	99.0

Table 4 represents questions directed to pregnant women to assess their knowledge about rubella in pre and posttest. It shows that 5.3% in pretest and the vast majority 96% in posttest knows the definition of rubella. Also, 14.3% knowing the correct age of exposure to rubella compared with 88.7% in posttest. On the same line 24.3% in pretest and the most 87.7% in posttest of pregnant women know that rubella is infectious disease. Regards the mode of transmission

of rubella virus, 16.7% of pregnant women was mentioned cough and sneezing in pretest and the majority 93.7% in posttest. Mild fever was mentioned as common symptoms which appear on the infected person by 22.7% of them in pretest versus 91.7% in posttest. With significance difference between pre and posttest in all previous variables  $p$ -value .000.

**Table 4.** Pregnant women's knowledge regarding rubella in pre/posttest

Variables	Pre-test (n = 300)		Post-test (n = 300)		p-value
	No.	%	No.	%	
<b>Definition of rubella</b>					
Correct	16	5.3	288	96.0	.000*
Incorrect	284	94.7	12	4.0	
<b>Common exposure age to rubella</b>					
Know	46	15.3	295	98.3	.000*
Don't Know	254	84.7	5	1.7	
<b>If know what is this age</b>					
Correct	43	14.3	266	88.7	.000*
Incorrect	257	85.7	34	11.3	
<b>Incubation period for rubella</b>					
14-21 days	10	3.3	198	66.0	.000*
30 days	290	96.7	102	34.0	
<b>Is rubella infectious disease?</b>					
Yes	73	24.3	263	87.7	.000*
No	227	75.7	37	12.3	
<b>Mode of rubella transmission</b>					
Know (droplet infection as cough and sneezing)	50	16.7	281	93.7	.000*
Don't know	250	83.3	19	6.3	
<b>†Symptoms of rubella</b>					
Mild fever	68	22.7	275	91.7	.000*
Headache	12	4.0	106	35.3	.000*
Runny nose	11	3.7	68	22.7	.000*
Pink rash	40	13.3	276	92.0	.000*
Enlarged lymph node	17	5.7	79	26.3	.000*
Aching joint	9	3.0	42	14.0	.000*
Don't know	214	71.3	1	0.3	.000*

†More than one answer were allowed; \* $p < .05$

Table 5 clears that only 7% of pregnant women can infected by rubella in pretest and 99.3% in posttest. Also, it reveals that only 5.7% of them stated that rubella can transmitted to the fetus in pretest compared with 99% in posttest. Regarding complication of rubella during pregnancy only 4.7% of pregnant women mentioned mental retardation compared with more than one fifth 22.7% in posttest, with significance difference between pre and posttest in all previous variables  $p$ -value .000 and .003.

Table 6 illustrates that more than one fifth 20.7% of preg-

nant women mentioned there is rubella vaccine and 99.7% in posttest. Also, this table clears that more than three quarter 77.4% of pregnant women mentioned that rubella vaccine found in obligatory schedule of vaccination in pretest and 99.3% in posttest. About 3% of pregnant women reported that rubella vaccine can protected the pregnant from disease in pretest and 99.3% in posttest. Three fifths 60% of them stated that accurate time for administer rubella vaccine was three months before pregnancy and 91.9% in posttest. With significance difference between pre and posttest  $p$ -value are .000 in most variables.

**Table 5.** Pregnant women’s knowledge regarding congenital rubella syndrome in pre/posttest

Variables	Pre-test (n = 300)		Post-test (n = 300)		p-value
	No.	%	No.	%	
<b>Pregnant woman can infected by rubella</b>					
Yes	21	7.0	298	99.3	.000*
No	279	93.0	2	0.7	
<b>Rubella can transmitted to the fetus</b>					
Yes	17	5.7	297	99.0	.000*
No	283	94.3	3	10.0	
<b>†Complications of rubella during pregnancy</b>					
Growth retardation	12	4.0	144	48.0	.000*
Cataracts	11	3.7	29	9.7	.003*
Deafness	19	3.0	109	36.3	.000*
Congenital heart defects	18	2.7	107	35.7	.000*
Defect in organ	26	2.0	160	53.3	.000*
Mental retardation	14	4.7	68	22.7	.000*
Don’t know	292	97.3	22	7.3	.000*
<b>Definition of congenital rubella syndrome</b>					
Correct	2	0.7	293	97.7	.000*
Incorrect	298	99.3	7	2.3	

†More than one answer were allowed; \**p* < .05

**Table 6.** Pregnant women’s knowledge regarding rubella vaccine in pre/posttest

Variables	Pre-test (n = 300)		Post-test (n = 300)		p-value
	No.	%	No.	%	
<b>Is there rubella vaccine</b>					
Yes	62	20.7	299	99.7	.000*
No	238	79.3	1	0.3	
<b>Rubella vaccine present in obligatory vaccine scheduled</b>					
Yes	48	77.4	298	99.3	.000*
No	14	22.6	2	0.7	
<b>Is there is rubella vaccine for protection of pregnant woman from disease</b>					
Yes	9	3.0	298	99.3	.000*
No	291	97.0	2	0.7	
<b>If yes when take it (n = 9)</b>					
Before pregnancy	5	55.6	297	99.7	.000*
During pregnancy	4	44.4	1	0.3	
<b>Accurate time of rubella vaccine for reproductive women:</b>					
Three months before pregnancy	3	60.0	273	91.9	.061
During pregnancy	2	40.0	24	8.1	
<b>Rubella can be treated</b>					
Yes	61	20.3	300	100.0	.000*
No	239	79.7	0	0.0	

\**p* < .05

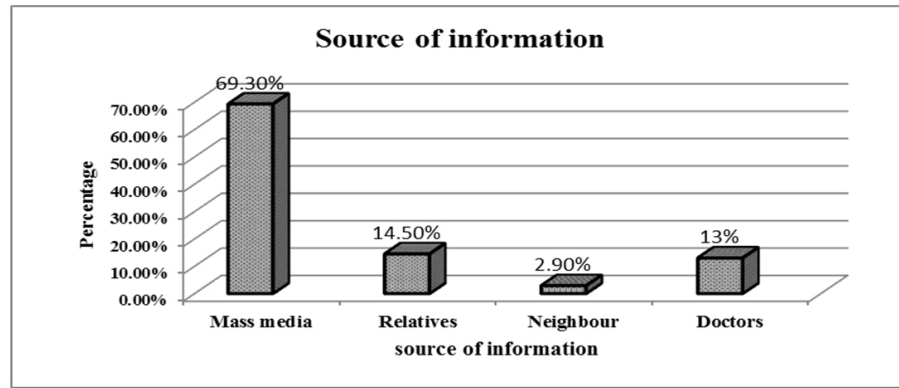
Figure 1 shows that about 69.3% of the pregnant women, which is the biggest percent; their source of information about rubella is from mass media.

Figure 2 declares that the mean score of knowledge regarding rubella in pre/posttest among pregnant women, it was 5.83 ± 2.48 in pretest and 20.07 ± 1.86 in posttest.

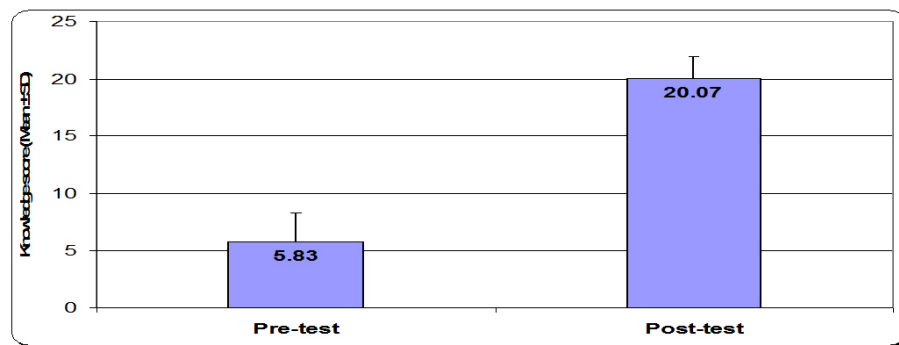
Table 7 demonstrates that there were significance differences

between mean score of knowledge regarding rubella and occupation and educational level among the pregnant women (*p*-values = .007\* and .000\* respectively) in pretest.

Table 8 illustrates that there was significance difference between history of exposure to rubella during previous pregnancy and the mean score of knowledge regarding rubella among pregnant women in pretest (*p*-values = .014).



**Figure 1.** Sources of knowledge about rubella among pregnant women, in antenatal Outpatient Clinic at Women’s Health Hospital, Assiut University, 2017



**Figure 2.** The mean score of knowledge regarding rubella in pre/posttest among pregnant women

**Table 7.** Relationship between personal characteristics and score of knowledge regarding rubella among pregnant women in pre – posttest

Variables	Knowledge score (Pre-test)	p-value	Knowledge score (Post-test)	p-value
	Mean ± SD		Mean ± SD	
<b>Age (years)</b>				
< 25	6.14 ± 2.97	.142	20.04 ± 2.03	.927
25-30	5.92 ± 2.34		20.09 ± 1.86	
> 30	5.38 ± 2.01		20.07 ± 1.68	
<b>Occupation</b>				
House wife	5.74 ± 2.45	.007*	20.03 ± 1.86	.152
Employer	7.50 ± 2.68		20.71 ± 1.86	
<b>Residence</b>				
Urban	5.78 ± 2.47	.954	20.09 ± 1.74	.798
Rural area	5.84 ± 2.49		20.06 ± 1.89	
<b>Education</b>				
Illiterate	5.57 ± 2.17	.000*	19.83 ± 1.49	.058
Read and write	5.08 ± 2.21		20.34 ± 2.25	
Primary and elementary	5.24 ± 2.25		19.81 ± 2.02	
Secondary	6.03 ± 2.41		20.07 ± 1.70	
University	7.91 ± 3.04		20.85 ± 2.18	

\*p < .05

**Table 8.** Relationship between history of rubella exposure during previous pregnancy and score of knowledge regarding rubella among pregnant women in pre – posttest

History of rubella during previous pregnancy	Knowledge score pre-test	p-value	Knowledge score post - test	p-value
	Mean ± SD		Mean ± SD	
Yes	12.00 ± 1.41	.014*	19.50 ± 3.54	.822
No	5.79 ± 2.44		20.07 ± 1.85	

\*p < .05

#### 4. DISCUSSION

Rubella is a viral disease that attack pregnant women and can cause CRS as a complication that may lead to illness, malformation and death of the fetus.<sup>[13]</sup> So this study aimed to assess awareness of rubella among pregnant women. Regarding personal data the present study showed that the mean of age was 27.75 ± 5.79. This was alike Fokunang et al.,<sup>[14]</sup> who implemented his study to determine the pervasion of rubella among pregnant women who are their mean of age was 27 ± 5.99.

Also the existing study revealed that the majority of women participated on the study were housewives (95.3%), this was on the same line with Hamdan et al.<sup>[13]</sup> who executed his study on pregnant women to identify spreading of cytomegalovirus and rubella among them in western Sudan. And the majority of pregnant women in this study were nonemployees (96%).

Around one third (31.3%) were illiterate that was discrepant from Esposito et al.,<sup>[15]</sup> who found that 43.1% of pregnant women included in his study has a middle school and 36.3% had a high school when he proceeds his study to assess their knowledge, attitude, and behavior about risk factors in pregnancy.

Concerning history of rubella infection, the existing study report that 2.3% of pregnant women had a history of rubella infection, but Esposito et al.,<sup>[15]</sup> found the percent was 15% this difference come from the group of people that the study applied on, as this study performed on pregnant women only, but Mohsen et al.<sup>[16]</sup> accomplished his study on all female aged from 20-30 years in Egypt. In addition, there was relation between pre test score of knowledge and history of rubella in previous pregnancy.

In the current study, there were some questions directed to the pregnant women to assess their knowledge about rubella. The results reported that 33% in pretest and 66% in posttest identified the incubation period of rubella. Also, 24.3% in pretest and 87.7% in posttest realized that rubella was infectious disease. These results disagreed with Iqbal et al.<sup>[11]</sup> who found that 52% asserted rubella was infectious disease and 9.5% identified the incubation period of the disease.

The actual study showed that the mild fever was the most frequent reported symptom of rubella by pregnant women 22.7% in pretest and 91.7% in posttest. It might explained by studied sample was made link between signs and symptoms of measles and rubella. This was in accordance with Iqbal et al.<sup>[11]</sup> who observed that nearly 33.5% of students informed mild fever as a common symptom of rubella.

While Mircea et al.,<sup>[17]</sup> who achieved his study to identify awareness and practice of pregnant women toward vaccination and prevention method for CRS and reported that 58.72% of pregnant women recognized a skin rash as a common symptom of rubella virus.

Spread of rubella infection from one to another is through contact with nose or throat secretions, airborne droplet and passed from pregnant women to the fetus through the placenta.<sup>[18]</sup> In current study the results represented that 16.7% in pretest and 93.7% in posttest have knowledge about mode of infection for rubella. It attributed to the participants were knew any virus can be transmitted by coughing and sneezing. This was in the same line with Iqbal et al.<sup>[11]</sup> affirmed that 41.5% of student recognized breathing as a mode of transmission.

The results of the present study disclosed that only 7.0% of the sample knew the pregnant can be infected by rubella. Also, the current study showed that 5.7% of the pregnant women reported rubella can transmitted to the fetus and 99.3%, 99.0% respectively in posttest. This could be due to pregnant women were previous exposed to it earlier. According to Hashema et al.,<sup>[9]</sup> the rubella is capable of transit the placenta leading serious complications.

In the present study, the vast majority of the pregnant women didn't know complications of rubella during pregnancy. This due to that most of pregnant women didn't hear on this disease before. This agreed with Kumari et al.<sup>[19]</sup> who observed that 86.98% of recipients didn't know the adverse effect of rubella on pregnancy and fetus.

According to knowledge of the pregnant women about congenital rubella syndrome; 99.3% of them didn't know it. This



can be explained by that most of the pregnant women had illiterate and this operational definition needed to professional person to know it. Congenital rubella syndrome (CRS) may occur as a result of intrauterine infection, particularly during the first trimester of pregnancy.<sup>[9]</sup>

The results of the present study cleared that; 20.7% of pregnant women mentioned that there is rubella vaccine while 99.7% in posttest and 77.4% of them reported this vaccine present in obligatory vaccination scheduled. This might explained by the women had children and give them immunization of MMR. This agreed with Kumari et al.<sup>[19]</sup> who found that 13.02% of participants stated that rubella can be prevented by vaccine.

In referral to accurate time of rubella vaccine for reproductive women, 40.0% stated that should be taking during pregnancy. This could be due to pregnant women didn't know seriousness of vaccination if given during pregnancy. This disagreed with Modak et al.<sup>[20]</sup> who found that 70.83% of participant mentioned appropriate time for taking the rubella vaccine just one time before marriage.

The person has various sources from which he can gain his information about anything such rubella; the actual study clarified that more than two thirds (69.3%) had their information from mass media. This wasn't agreed with Modak et al.,<sup>[20]</sup> who applied his study on unmarried females to assess rubella vaccinations among them in India and showed that 32.4% of females their source of knowledge was from hospitals.

## 5. CONCLUSION

Rubella is public health problem because of its serious effect on the fetus if affect mothers especially in early pregnancy or just before conception. The mean score of knowledge regarding rubella among pregnant women in pretest was  $5.83 \pm 2.48$  while in posttest  $20.07 \pm 1.86$ . There was statistical significance difference between history of previous exposure to rubella and the mean score of knowledge. There was an obvious lack of knowledge regarding rubella.

### Recommendation

- Application of continuous health education programs for females focus on value of rubella immunization before conception to reduce burden of rubella.
- It is important to increase awareness of pregnant women through different mass media especially T.V to improve their knowledge regarding the German measles and their complications.
- Increase effectiveness, quality and availability of antenatal care services and should be provide adequate counseling for child bearing women before pregnancy.

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### CONFLICTS OF INTEREST DISCLOSURE

The authors declare that there is no conflict of interest.

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