

Occupational Exposure of Pregnant Women to Agriculture Work Hazards

Latifa fouda*Manal Hassan**

* Community Health Nursing Department, Faculty of Nursing, Tanta University, Egypt.

**Obstetric Nursing, Department, Faculty of Nursing, Tanta University, Egypt.

Abstract: The agricultural sector is a significant employer of women, **The aim of the present study** was to evaluate the impact of an educational program on knowledge and practice among pregnant female farmers attending a rural health units in Tanta city.

Material and Methods: This study is a cross-sectional, interventional study. The study subjects were the pregnant women attending the rural health unit at Sebarbay, in Tanta city. The study was conducted from first of March to June 2013, three times per week from the initial pre-test to the post-test. Their ages ranged from 18 years to 40 years. The total sample included {73} pregnant women working in the farm, fifteen {15} of them is not participate, A pilot study was conducted among {10} pregnant women and excluded from the study {48} of them were accepted to participate. The pregnant women were chosen for being first trimester till third trimester and time of delivery

Results: There was significant improvement after implementation of the educational sessions about women's practice regarding occupational hazards in comparison with women's knowledge and practice pre sessions.

Conclusion and recommendations: Pregnant women working in the field are exposed to environmental hazards which have a negative impact on their health and their pregnancy outcome. An educational program on the occupational and environmental hazards and ways to be protected against them should be implemented on a large scale in rural health units. A study of female reproductive health is warranted among all females working in the fields whether pregnant or not in order to determine exactly the scale of the problem. Increasing the awareness on the harmful effects of pesticides among agricultural workers especially the females is necessitated.

I. Introduction

The agricultural sector is still a significant employer of many women as wives, partners or family members. These workers may not be covered by occupational safety and health legislation. Women are concentrated in the elementary jobs in the agricultural field, which the seventh highest employer of women, accounting for 3 % of women in employment. In Greece and Portugal, agriculture is still the main employer of women. ⁽¹⁾ Many women will also contribute as wives or partners of farmers, and temporary, casual, seasonal work, for example during the harvesting season, is probably an important feature of women's work in this sector. ⁽²⁾ Traditionally, a farm is a family concern often worked by a couple, with the wife helping her husband with numerous daily tasks. ⁽³⁾ Of family workers in agriculture in the UK, 38 % are women. Women are concentrated in elementary jobs in the agricultural sector. Women farm managers are generally older and have a lower level of agricultural training than men. ⁽⁴⁾

Many women, who are partners in family run farming businesses, and not employees, may fall outside the scope of safety and health legislation. Some Member States, such as the UK, have decided to treat such farm workers as employees for the application of safety and health law, and have covered the issue in sector guidance. ⁽⁵⁾ Women working in agriculture exposed to the same hazards and risks as male workers, but in addition face further risks, particularly to reproductive health (e.g. from pesticides and biological agents). Additionally, women may be at greater risk of work related neck and upper limb disorders, and reproductive system. ⁽⁶⁾ Research on occupational exposures and reproductive health has made important scientific contributions in the past few decades. Most studies have focused on effects of pesticides ⁽⁷⁾

The hypothesis that exposure to pesticides may interfere with the human reproductive function was first documented among men more than 20 years ago. Investigations among women are not numerous, but here too, negative reproductive effects such as spontaneous abortions, congenital defects and pre-maturity have been confirmed by a number of studies [5-8]. Infertility and delay in conception is another reproductive health effect observed in association with pesticide exposure of women in a number of different studies. Occupational risks to which women are exposed include as well physical agents such as radiation and noise, ergonomic factors namely heavy workload, shift work and psychological stress.

The aim of the present study was to evaluate the impact of an educational program on knowledge and practice among pregnant female farmers attending a rural health unit in Tanta city.

II. Material And Methods

The study design:

This study is a cross-sectional, interventional study and working in the farm.

Target population and settings:

The study subjects were the pregnant women attending the rural health unit at Sebarbay, in Tanta city, and working in the farm

Study population and sampling:

The study was conducted from the first of March, 2013 to end of June, their ages ranged from 18 years to 40 years. 48 pregnant women fulfilling the inclusion criteria were accepted to participate. Sessions were three times /week from the initial pre-test to the post-test. The total sample included {73} pregnant women, fifteen {15} of them were not participating fifty eight {58} of them were accepted to participate. A pilot study was conducted among {10} pregnant women and excluded from the study. The pregnant women were chosen for being first trimester till third trimester and time of delivery

Exclusion criteria:

- 1- Pregnant women aged ≤ 17 years, besides those who refused to complete the questionnaire were not included in the study.
- 2- Pregnant women not working in the farm.

Data collection:

A pilot study was conducted among {10} pregnant women initially to test the designed questionnaire to ensure that it was easily understood and could be answered. Those who participated in the pilot were excluded from the study.

- 1- Pre-test stage in the baseline interview: an interviewing questionnaire sheets was answered by direct interview with pregnant females. The questionnaire took about 15 to 30 minutes to be filled.

The study questionnaire included the following:-

- 1- **Socio-demographic data:** age, residence, level of education (low – intermediate – high), occupation, husband education, husband ' occupation, family income, family size, housing condition and numbers of rooms.
- 2- **Data about the present pregnancy (obstetric data):** gravidity (primigravida or multi- gravida) – history of previous delivery (normal labor – abnormal labor).
- 3- **Medical history:** any existing medical illness such as: hypertension, diabetes, tuberculosis, anemia, Asthma, either yes or no).
- 4- **Data about obstetric history**
- 5- **Past working experience of the pregnant women which included:** age of starting work, working days per week, reasons for initiating work, working hours, rest periods, seasons of work, nature and tasks preformed by the working women .
- 6- Previous complaints related to work condition and work environment.
- 7- History of hazards faced during work

II- Knowledge and practice of pregnant women:

- 1- Knowledge of pregnant women work about hazards included:-(7questions)
- 2- Physical hazards: exposure to heat (hot or cold), humidity, noise, and working during night.
- 3- Chemical hazards: exposure to dusts and straws from crushing crops, exposure to fumes, gases, exposure to pesticides and fertilizers.
- 4- Mechanical hazards: using different agriculture machines, working long hours standing or bending the head and the neck, climbing trees for picking the crops, and experience in using agricultural machines.
- 5- Biological hazards: dealing with animal's bites from mosquito and flies, eating fruits and vegetables directly without washing, dealing with water canals in irrigation and using it in washing, dealing and disposable of animal's excreta and breeding of rats in fields.
- 6- Psychological hazards: dealing with stressful situation, abuse during work, problems with others, unsatisfaction with working, forced labor, exposure to emotional pressures and anxiety
- 7- Personal hazards: these included: - risk factors that increase the rate of hazards as young age, inexperience, physical illness and fatigue, stress, careless and misestimating the hazards.

- a- Practice of pregnant women(13questions): they were asked about safety and protective measures used by them to protect themselves and reasons for not using safety and protective measures

Pregnant women were asked about Knowledge, and practice scores:

The knowledge questionnaire consisted of 7 questions. Each one was given two (2) points for correct and complete answers; one (1) point for the correct incomplete answers and a score of zero (0) for the incorrect or (no) answer.

As regards the practice, further (13) questions were designed to assess practices of pregnant women toward occupational hazards during pregnancy. The answers were given scores of (2) points for good practice, (1) point for average and zero (0) for bad practice.

The sum of the total scores for either of knowledge or the practice varied from (0 up to 14for knowledge) and (up to 26 for practices) points maximum score. The sum of the total knowledge or practice score for each pregnant women was divided by the maximum total score (14 or 26) and multiplied by (100) to get percentage of maximum score

Women who achieved a score of $\geq 60\%$ of the total score were considered to have a satisfactory knowledge and who achieved $< 60\%$ were considered to have unsatisfactory knowledge [from 0-30% poor and $>30- <60\%$ moderate]

III- Intervention with the health education program:

Objectives: educating the pregnant women regarding occupational hazards

Target, The study subjects were 48 pregnant women attending the rural health unit at Sebarbay, in Tanta city.

Settings: inside the waiting room of rural health unit.

Number and duration of the sessions: 12 lectures, from (1½ -2) hours on the average given in four weeks (3 lectures/ week). The lectures were given for pregnant women early in the morning.

Methods: lectures were followed by free discussions with pregnant women.

A booklet containing all the topics of the program was distributed to pregnant women. The topics were based upon the literature review.

Teaching aids: overhead projector.

Issues included in the intervention:

All Physical hazards, Chemical hazards Mechanical hazards, Biological hazards: Psychological hazards, Personal hazards, and effect of their complications on pregnant women and their fetus

IV- Post –test stage:

A post test questionnaire was filled by the pregnant women at the end of the health education program (4 weeks period), to assess the changes in knowledge and practice of the studied sample.

Statistical analysis:

The scores of the pre-post test questionnaires were summed regarding knowledge and practices. Then the data was summarized in tables, chi-square test was applied and the 5% level of significance was adopted.

Table1 shows that the majority of women were aged from 20-30 years old, with mean of age 25.2 ± 8.22 . The table also shows that about (37.5%) of women had primary education, farmers (81.2%), and about (66.6%) revealed that their income was not enough and women and their husbands (37.5%) were the main source of income. Also most of women's husband education (45.8%) was secondary education and (43.7%) were farmers.

Table2 reveals that about (47.9%) of pregnant women had more than 4 paras, about (75%) had history of infertility, (66.6%) of women recorded prolonged menstrual cycles, (54.1%) of them revealed previous history of delayed menstruation and (64.5) revealed presence of pre menstrual pain before cycles. Again about (16.7%), (16.7%) of women reported previous history of birth defects.

Table3 reveals that about (66.6%) of pregnant women were starting agricultural work more than 10 years before marriage, about (43.7%) of women their work task was picking crops, (56.2%) collecting worm from plant, (60.4%) treating raw animal sewage. Women worked at time of picking crops only, and during summer and vacations (68.7%), (60.4%) respectively. The table also shows that about (33.3%) of women worked from 4- 6 hours, without days off (56.2%) with short duration of rest (29.1%), most of women (75) believed in presence of work hazards and about (77.1%) did not wear safety clothes during work.

Table4 shows women's knowledge regarding occupational hazards. There were significant improvement after implementation of educational sessions about women's knowledge regarding occupational hazards in comparison with women's knowledge pre sessions such as : knowledge regarding physical, chemical, biological, mechanical and psychological hazards $p>0.0201$.

Figure1 shows the distribution of women according to their total score level of Knowledge about occupational hazards. There was significant improvement after implementation of educational sessions about women’s knowledge regarding occupational hazards in comparison with their knowledge pre sessions, where most of women revealed good level of knowledge regarding physical, chemical, mechanical, biological and psychological hazards.

Figure 2 shows the distribution of women according to their total score level of practice regarding occupational hazards. There were significant improvement after implementation of educational sessions about women’s practice regarding occupational hazards in comparison with their practice pre sessions, where about (62.5)of women revealed satisfactory level of practice post sessions compared to (15) pre-sessions regarding occupational hazards.

Table5 shows women’s practice regarding occupational hazards. There was significant improvement after implementation of educational sessions about women’s practice regarding occupational hazards in comparison with women’s practice pre sessions such as : avoiding long time standing or bending the head, taking up rest periods during work, wearing protective clothes to avoid exposure to sun rays and humidity , avoiding eating raw vegetables and fruits directly from the soil and also ,avoiding inhalation of dusts and rice straw from crushing crops. $p>0.0330$.

Table 1: Percent distribution of women regarding biosocial characteristics (n= 48):

Bio-social characteristics of women	No	%
Age(years)		
<20	7	14.58
20-30	29	60.42
31-40	3	6.25
>40	9	18.75
Range	18-41	
Mean ± SD	25.2±8.22	
No of living children:		
< 5	30	62.50
> 5	12	25.00
Died children	6	12.50
Women’ level of education:		
Read and write or illiterate	15	31.25
Primary education	18	37.50
Secondary education	13	27.08
University	2	4.17
Women’ Occupation:		
Farmer	39	81.25
Housewife & work on her own	6	12.50
Farmer or another work	3	6.25
Husband’ level of education:		
Read and write or illiterates	8	16.67
Primary education	11	22.92
Secondary education	22	45.83
University	7	14.58
Husband’ Occupation:		
Farmer	21	43.75
Farmer & another work	11	22.92
Technical Or manual worker	8	16.67
Employee	4	8.33
Not working	4	8.33
Family income / month		
Not enough	32	66.67
Enough	9	18.75
Enough and more	7	14.58
Source of income		
-Both husband &women	18	37.50
-Women	9	18.75
-lands and properties	11	22.92
-Aids and/ or helpers	10	20.83
Type of house		
Owning a house	22	45.83
Rent or having flat	15	31.25
Shared house	11	22.92

Table 2: Distribution of women according to their reproductive history

Women Reproductive History	No	%
Parity:		
Primipara	5	10.42
2-3	10	20.83
4-	23	47.92
<4	10	20.83
- Reproductive hazards :		
Previous history of spontaneous abortions :	17	35.42
None	12	25.00
1-2	13	27.08
3-4	6	12.50
<4		
Menstrual disturbances history		
-Prolonged waiting time to pregnancy (more than one year) (history of infertility)		
Yes	36	75.00
No	12	25.00
-Previous history of prolonged menstrual cycles		
Yes	32	66.67
No	16	33.33
-Previous history of delayed menstruation		
Yes	26	54.17
No	22	45.83
-Presence of pre menstrual pain	31	
Yes	17	64.58
No		35.42
Presence of pre menstrual pain		
Yes	5	10.42
No	8	16.67
Previous history of birth defects:		
Stillbirths		
Preterm babies	7	14.58
Congenital anomalies	9	18.75
IUFGR	5	10.42
IUFD	8	16.67
LBW	6	12.50
None		

Table 3: Distribution of women according to occupational data

women history of work	No	%
Starting agricultural work (length of exposure):		
< 10 years	16	33.33
≥ 10 years	32	66.67
Mean ± SD		
Range		
Working before marriage :		
-yes	28	58.33
-no	20	41.67
Reasons of working in agriculture:		
Help in family income		
Help the husband in the work	19	39.58
According to husband desire	14	29.17
To be independent	11	22.92
(more than one answer)	10	20.83
Nature of work in the field (work task):		
Picking crops		
Spraying pesticides	21	43.75
Collecting worm from plant	16	33.33
Planting grains	27	56.25
Presence of domestic animals at home	18	37.50
(dealing with raw animal sewage)	29	60.42
(more than one answer)		
Length of working time		
Daily through the year	27	56.25
During summer & vacations	21	43.75
At time of picking crops only	29	60.42
According to occasions	33	68.75
(more than one answer)	16	33.33
Working hours / day		
Less than 4 hours	21	43.75
from 4 to 6 hours	11	22.92
> 6 hours	16	33.33
Days off / week		
Yes	21	43.75
No	27	56.25
Taking rest period during work		
Yes	37	77.08
No	11	22.92
Duration of rest:		
Half an hour	14	29.17
One hour	12	25.00
More than one hour	11	22.92
Belief in presence of work hazards		
Yes	36	75.00
No	12	25.00
Believe of adverse effect of work hazards on pregnancy		
No effect	11	22.92
On my course of pregnancy	10	20.83
On my fetus	9	18.75
On labor & delivery & my newborn(preterm)	10	20.83
In postnatal period	8	16.67
Wearing safety clothes during work		
Yes		
No	11	22.92
Not often	37	77.08
If No, why you don't use:		
I dislike it	11	22.92
There is no hazard	10	20.83
There is no money	8	16.67
Unavailable	9	18.75
Presence of persistent complain or arising problem due to work (warning signs):		
Fatigue & weakness		
Vertigo	9	18.75
Pain	6	12.50
Spotting	5	10.42
Bleeding	7	14.58
Abdominal pain	8	16.67
Dysuria	4	8.33
Severe headache	4	8.33
Visual disturbance	3	6.25

Fever & infection	1	2.08
Backache	3	6.25
Wheezes ,cough &asthma	2	4.17
*More than one answer	2	4.17

Table 4: Women’s knowledge regarding occupational hazards:

Variables	Pre -sessions	Post- sessions	t test	P value
	Mean ±SD	Mean ±SD		
1- Women's knowledge related to personal hazards: 8	3.22±2.01	6.25±1.85	3.21	0.001*
2- Women's knowledge related to physical hazards: 4	1.98±0.98	3.11±0.98	2.98	0.013*
3- Women's knowledge related to chemical hazards: 5	2.12±1.03	3.68±1.32	2.15	0.032*
4- Women's knowledge related to mechanical hazards : 4	1.58±0.65	2.98±0.98	2.11	0.035*
5- Women's knowledge related to biological hazards : 8	3.98±2.32	6.52±1.98	2.98	0.0201*
6- Women's knowledge related to psychological hazards : 5	1.622±1.07	3.98±1.68	3.11	0.013*
7- Women's knowledge related to adverse effects of work hazards on pregnancy & pregnancy outcomes):4	1.22±1.11	2.31±0.852	2.41	0.021*

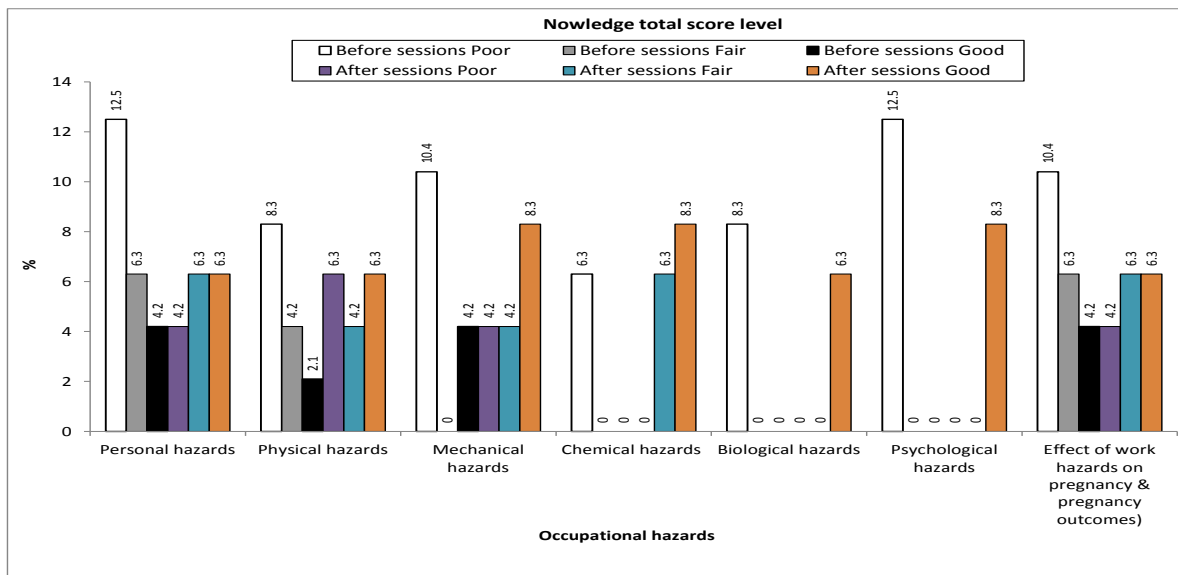


Figure 1: Distribution of women according to their total score level of Knowledge of occupational hazards

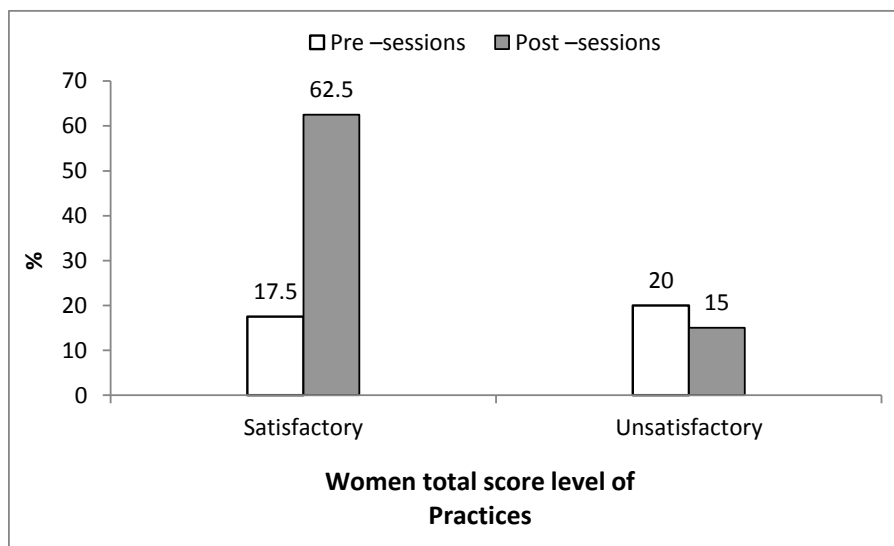


Figure 2: Distribution of women according to their total score level of Practices regarding Occupational hazards.

Table 5: Women practices regarding occupational hazards (maximum grade for practice was 4)

Variables	Pre –sessions Mean ±SD	Post –sessions Mean ±SD	t test	P value
1-Wearing protective clothes to avoid exposure to sun rays and humidity	2.11±0.98	3.52±0.982	1.98	0.048*
2-Washing hands before and after dealing	1.98±0.785	3.22±0.885	2.32	0.019*
3- Avoiding eating raw vegetables and fruits directly from the soil	2.33±0.98	3.68±0.69	1.98	0.048*
4- Avoiding urination and defecation in canals or fields	2.17±0.77	3.02±0.74	2.01	0.031*
5- Avoiding long time standing or bending the Head	1.78±0.698	2.98±0.652	2.11	0.0330
6- Avoiding inhalation of dusts and rice straw from crushing crops	2.01±1.01	3.33±0.74	1.99	0.042
7- Avoiding using the empty bottles of pesticides in drinking	1.01±1.11	3.41±0.692	2.15	0.036*
8- Avoiding inhalation of fumes and gases	1.13±0.968	3.21±0.49	2.31	0.031*
9- Avoiding the risk of climbing trees for picking fruits during pregnancy	1.68±1.01	2.98±0.79	2.41	0.028*
10- Avoiding walking in barring foot	1.74±0.98	3.25±0.33	2.68	0.01*
11-Avoiding using hard and sharp tools	1.82±1.11	3.16±0.52	2.00	0.041*
12- Taking rest periods during work	2.01±1.07	2.98±0.65	1.32	0.121
13-Avoiding dealing with raw animal sewage with bare hands.	1.68±1.10	3.11±0.336	2.62	0.011*

III. Discussion

The present study is an interventional study, about knowledge and practice of pregnant women exposed to occupational hazards. They were tested before and after implementing an educational program and safeguarding their reproductive health. The present results have revealed a prolonged waiting time to pregnancy (more than one year) in 75% of the studied women. This might be attributed in part to exposure to pesticides, both the women working in the field or in their partness. This agrees with Sharpe & Irvine who found a strong evidence of link between environmental chemicals and adverse effects on human reproductive health^(7,8). Dioxin, pesticides, as well as other environmental contaminants present in waste materials have estrogenic and androgenic properties which are known to interfere with the reproductive life through disrupting the endocrine balance. This has been verified in several previous studies relating exposure to pesticides and delayed time to pregnancy.⁽⁹⁻¹²⁾

Another plausible explanation for the increased time to pregnancy is that working females have no time to practice sex in the appropriate timing of ovulation due to fatigue or possible night work. This finding agrees with Harley et al⁽⁴⁾ who found that women working in agriculture had lower frequency of intercourse than other women.

As regards, the outcome on the fetus, 25% of the studied pregnant women had previous history of spontaneous abortions form 1-2 and (27.08%) had 3-4 abortions which might be related to exposure to pesticide in the field. In line with our findings, Arbuckle et al⁽¹³⁾ and Korrick et al⁽¹⁴⁾ found similar results.

In the present study, before implementing the educational program, pregnant women exposed to work hazards had a significant low pregnancy outcome especially on birth outcomes. This is possibly due to lack of knowledge about the different hazards they are exposed to. Most of them did not wear safety clothes during work (77.08%) and they did not pay attention to the presence of complaints arising from work environment namely spotting, bleeding, abdominal pain and dysuria. In addition, they had a poor total score of knowledge about occupational hazards before the implementation of the educational program.

On the contrary, a significant progress occurred after the program sessions. A statistically significant improved knowledge was observed in relation to all types of hazards ($P < 0.05$) and a high statistically significant difference was found in knowledge related to personal hazards ($p \geq 0.001$).

In addition, a statistically significant improvement in total knowledge score was found after program implementation and “good” score was predominating. (Table 5, figure 1). Regarding the impact of the educational program on pregnancy outcome statistically significant difference were observed post sessions in terms of pregnancy complications ($p=0.004$) and post partum problems ($p=0.049$)

In relation to physical hazards, the educational program has produced a statistically significant change in total score of knowledge and practice among pregnant women especially in relation to the negative effect of noise and increased workload on pregnancy outcomes.

This is in agreement with Talamanca⁽⁶⁾ who stated that noise- induced stress potentially interferes with the endocrine system which is a possible risk factor confirmed in human populations exposed to high levels of environmental noise.⁽¹²⁾

IV. Conclusion

Pregnant women working in the field are exposed to environmental hazards which have a negative impact on their health and their pregnancy outcome. They lack knowledge on these occupational hazards and hence they behave in a wrong manner and do not take safety precautions.

The implemented educational program has a statistically significant impact on their knowledge and practice of healthy behaviors in order to safeguard their reproductive health and the outcome of their pregnancies.

The results of the present necessity represent a cohort of pregnant females in rural health unit and reflect the need to be generalized in order to estimate the real exposure via biological monitoring.

V. Recommendations

The results of the study recommend that:

1. An educational program on the occupational and environmental hazards and ways to prevent them should be implemented on a large scale in rural health units.
2. A study of female reproductive health is warranted among all females working in the fields whether pregnant or not in order to determine exactly the scale of the problem.
3. Increasing the awareness on the harmful effects of pesticides among agricultural workers especially the females is necessitated.

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