

Effect of Compression Stockings on Morning Sickness among Primigravidas

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Abstract

Background: Morning sickness during pregnancy can range from mild discomfort to significant morbidity that leads to certain complications for mother and fetus. Therefore, this **study aimed** to assess the effect of compression stockings on morning sickness among primigravidas. **Materials and Method:** A Quazi experimental research design was used. The study was conducted at the obstetric outpatient clinic of National Medical Institute in Damanhour, El-Behiera Governorate. A purposeful sample of 80 pregnant women was recruited. Subjects who fulfilled the inclusion criteria were assigned to one of the two equal groups: study and control group. Four tools of data collection were used: A structured interview questionnaire, visual analogue scale (VAS) for severity of nausea and vomiting, (NVPQOL) nausea, vomiting pregnancy quality of life and pregnancy unique quantification of emesis and vomiting (PUQE). **Results:** There was a highly statistically significant differences after two weeks intervention between the study and control group regarding the severity of nausea and vomiting, ($P=0.000$). There was severe effect of morning sickness on women's quality of life among both study and control group before intervention (77.5% and 75%) respectively. However, there was a greater improvement after the period of compression among the study group and there was a statistically significant differences between the study and control groups post intervention, $P=.000$. **Conclusion:** From the results of the current study, it can be concluded that morning sickness decreased among women who used compression stockings for two weeks during early pregnancy. **Recommendation:** Emphasize the use of compression stockings in the non-pharmacological protocol for the treatment of NVP as an effective strategy for such a problem.

Keywords: Compression stocking, morning sickness and primigravidas

Introduction

Morning sickness of pregnancy affects between 70 and 85% of pregnant women. The severity of it ranges from mild or moderate to severe, and can occur at any time of the day and last for differing periods (Mitsuda et al., 2019). Morning sickness symptoms appear usually around 4 and 6 weeks of

pregnancy and peak between 8 and 12 week. Most of the symptoms disappear by 20 week of gestation (Balíková and Bužgová, 2014).

The causes of morning sickness are unknown. However, observational data indicates that these conditions correlate with levels of hormones called human chorionic gonadotropins and estrogen.

There are other contributing factors that may be responsible about morning sickness such as: younger age of the mother, body weight, no previous completed pregnancy, first pregnancy and history of morning sickness in prior pregnancies. Biological and psychological factors may play role in these symptoms (**Lee and Saha, 2011**). Clinically, around 15% of pregnant women continue to have nausea and vomiting of pregnancy “NVP” beyond 20 weeks of gestation. Severe prolonged NVP correlates closely with vitamin B deficiency, chronic psychological stress, and weight loss. These conditions play a crucial role in shaping maternal and fetal outcome (**Davis, 2004**).

Maternal and fetal outcomes in pregnancies with uncomplicated nausea and vomiting are better; there is a decreased risk of miscarriage, as well as lower rates of preterm delivery, growth restriction and fetal death. Women with morning sickness that does not respond to treatment or complicated by weight loss have increased risks of fetal growth restriction and fetal death as well as preeclampsia and maternal complications associated with vomiting (e.g esophageal rupture, retinal hemorrhage, and pneumothorax (**Arnsten & Rubia, 2012**)).

Treatment should be directed towards reducing symptoms while posing the least amount of risk to the fetus and mother. Various modalities have been used, some without evidence of benefit; therapies used in early pregnancy must be demonstrably safe and do not increase the risk of spontaneous abortion or birth defects. A number of therapeutic interventions

ranging from pharmaceutical products to natural therapies are available to relieve symptoms (**Mendoza and Amsler, 2017**).

Traditional first-line therapy for morning sickness includes dietary modifications such as avoidance of large meals and consumption of low-fat, low-fiber and bland foods. Avoidance of foods with strong smells and those with increased protein and liquid content is often recommended. There are a variety of other non-pharmacologic therapies of morning sickness commonly used by women and recommended by health care professionals; most of these treatments have limited evidence supporting their benefits as wearing compression stockings in early pregnancy (**Mohamed et al., 2016**).

Wearing compression stockings in early pregnancy can improve nausea and vomiting-associated symptoms, dizziness, leg pain physical and physiological limitations (**Queensland, 2014**). Compression stockings ensure normal blood flows by exerting external pressure on the veins and thus stabilizing the vessel walls. The venous valves are again able to close and in this way prevent the backflow of the blood (**Royal College of Obstetricians and Gynecologists, 2015**).

Clinical guidelines recommended that pregnant women should wear compression stockings to prevent and treat venous edema, venous thromboembolism and varicose veins (**Bloding et al., 2016 and Gonder et al., 2018**). However, this strategy did not prove its effect on morning sickness during pregnancy. More research is required to

fill the research gap. If this simple nursing intervention is proven effective, then the need for pharmacological intervention would be unwanted or decreased. The nursing body of knowledge will also be enriched with simple and effective interventions for morning sickness symptoms.

Significance of the study:

Morning sickness is one of the most common complaints and the first symptom occurring during pregnancy. Although it is not life-threatening but it can cause stress for the pregnant women and affect her quality of life. Majority of the women naturally suffer from nausea in the first trimester of pregnancy with or without vomiting in which severity and duration can vary from one to another (Erick et al., 2018). When nausea and vomiting intensify, pregnant women may experience lower levels of social, emotional and psychological function that may lead to disturbance in their relations with the spouse and others. They can experience weakness, depression, and fear of fetal loss. Considering that morning sickness affected the general health and physical functioning of pregnant mothers, it is therefore suggested that pharmacological or non-pharmacological methods of these symptoms should be considered (Balíková and Bužgová, 2014 and Vakilian et al., 2019)

Aim of the study

This study aimed to assess the effect of compression stockings on morning sickness among primigravidas.

Research Hypotheses:

H1: Pregnant women who receive lower leg compression during early

pregnancy have lower nausea intensity than those in the control group.

H2: Pregnant women who receive lower leg compression during early pregnancy have lower vomiting intensity than those in the control group.

Operational definitions:

Compression stockings: They are stockings woven with an elastic material as rubber and used to provide support for the leg and improve circulation.

Materials and Method

Research design:

A quazi experimental research design was used where the effect of one independent variable (compression stockings) on one dependent variable (morning sickness) was investigated.

Setting:

The study was conducted at the obstetric outpatient clinic of National Medical Institute in Damanshour, El-Behiera Governorate. This setting was selected because it is an educational hospital where the needed intervention can be implemented with sufficient staff cooperation and without real obstacles. In addition, that the turnover of pregnant women is satisfactory for the study.

Subjects:

A Purposeful sample of 80 pregnant women was recruited from the above mentioned settings according to the following criteria:

Inclusion criteria:

- Primigravida.
- During the first trimester

- Free from any medical diseases.
- No history of edema, thrombosis and venous insufficiency.
- Suffer from morning sickness.
- Normal course of pregnancy.
- Willing to participate in the study.

Subjects who fulfilled the inclusion criteria were assigned to one of the two groups:

Study group (G1): 40 pregnant women who wore elastic stockings compression.

Control group (G2): 40 pregnant women who followed the routine care of pregnancy.

Data collection tools:

Four tools were used to collect the necessary data.

Tool I: A structured interview questionnaire

This tool was developed by the researcher based on extensive review of relevant and current literature to elicit the basic data as follows:

- Socio-demographic characteristics, including: age, social condition, level of education, occupation and residence.
- Obstetric history: date of last menstrual period, expected date of delivery and gestational weeks.

Tool II: Visual analog scale for severity of nausea and vomiting (VAS)

It is a self-reported scale that is used to measure subjective data concerning different health problems such as pain

and dyspnea. It was used in the current study to measure the severity of nausea and vomiting. It consists of a 10 cm horizontal line, the extreme left hand side of the scale indicates 'no pain', and the extreme right hand side of the line represents "Worst pain". Above the scale is the instruction to the women to mark any point on the line that approximately describes her feeling of nausea and vomiting. VAS represents a continuum of intensity, where 1-3 is mild, 4-6 is moderate, and 7-10 is severe nausea and vomiting (Boogaerts et al., 2000). It was adopted and translated into the Arabic language to suit the Egyptian culture.

Tool III: Nausea, vomiting pregnancy quality of life (NVPQOL)

This tool was originally developed by Magee et al., 2002. The NVPQOL questionnaire consists of 30 items and covers four general domains (physical symptoms and aggravating factors, fatigue, emotions, and limitations). The first domain includes items as (nausea, sick to her stomach, vomiting, dry-heaves, poor appetite, symptoms worse in evening, not eaten for longer than she would like, worse when exposed to certain smells, worse when exposed to certain foods), The second domain includes (fatigue, lack of energy, exhausted, tired). Items related to third domain are (emotional, less interested in sex, downhearted, frustrated, fed up with being sick, reassured that her symptoms are part of normal pregnancy, can't enjoy her pregnancy). The fourth domain has the following items (everything is an effort, accomplished less than she would like, took longer to get things done than usual, difficult or took extra effort to

perform, difficulty maintaining her normal social activities, rely on her partner to do things, difficulty looking after home, difficulty shopping for food, difficulty preparing or cooking meals, cut down on amount of time she spent at work or other activities). Each item of the NVPQOL is measured using a Likert 3-point scale ranging from 0 (none of the time) to 2(all of the time). The total score of NVPQOL ranged as follows: less than 20 degree (mild effect), 20 to less than 40 degree (moderate effect) and 40-60 degree (severe effect).The total NVPQOL score can be obtained by summing the 30 items and ranges between 30 and 60.Lower scores correspond to better QOL.

Tool IV: pregnancy unique quantification of emesis and nausea (PUQE)

The PUQE questionnaire, including the quality of life questions. Briefly, the questionnaire consisted of 3 questions related NVP. It included the period of time, the women was nauseated, the number women's vomiting and times that the women had retching without vomiting during the last 24 hours. Responses were then calculated through 5 different categories that were scored from 1 to 5, according to the severity of the symptoms. The sum of the PUQE category scores was used to classify the NVP as "mild" if the score was between 3–6 points, "moderate" if between 7–12 points, and "severe" if 13 points or higher (Birkeland et al., 2016).

Tools validity and reliability

Tool (I) was tested for content validity by a jury of 5 experts in obstetric and gynecological nursing and checked

for its reliability by using Cronbach's alpha test, the result was (0.84). Tools (II, III and IV) were adopted by the researchers and used for data collection.

Pilot study:

A pilot study was carried out on a sample of 8 (10%) women, they were selected from the previously mentioned setting to assess the tools for its applicability, clarity and the time required to complete the tools. Following this pilot study, the tools were modified and made ready for use. The subjects who included in the pilot study were excluded from the total study sample.

Data collection procedure:

- Official letter from the Faculty of Nursing, University of Damamur was directed to the responsible authorities of the study setting to take their permission to collect data after explaining the purpose of the study.
- The period of data collection was 6 months (from the beginning of January to the end of June 2019). Each women was individually contacted and informed about the aim of the study in order to obtain her oral and written consent.
- Data was collected using tool (1) from both groups through an interview schedule for 10 – 15 minutes, which was conducted individually and in total privacy.
- Compression stockings provide gradual pressure, they are tightest in the foot and ankle area and loosen slightly as they go up the leg. Because compression stockings should be snug around legs, they can

be difficult to get on, so in the study group, the researchers demonstrated in front of women the steps of wearing and removing the elastic compression stockings and allowed women to watch an educational video in a quiet room. Then, the researchers asked the women to wear and remove it again to be sure that they will using it correctly. A brochure with details related to the steps of correct fit, removing and reapplying stockings, the importance of reporting any swelling or pain and care of her leg skin and stockings were supplied to every woman. The researchers confirmed the need to seek advice when the women experience any altered sensation, pain or swelling in the legs. Women were instructed to wear it every day and off at night for two weeks during early pregnancy. The researchers supplied every woman with two pairs of appropriately sized compression stockings after measuring the circumference and length of her calf, the circumference of her ankle and using the sizing guide on the compression sock packaging to find the right fit for her. In addition, the researchers asked the women to record the daily number of hours worn.

- Women in the control group received routine care provided by the researchers. Education about relieving morning sickness was provided during the women's follow up. Women in the control group were informed that they were not supposed to use any other additional strategies to manage morning sickness until the end of the evaluation.

- Tools II, III & IV were collected from the study group two times: one before applying the compression stockings and the second after two weeks from wearing them. In addition, the control group was also assessed twice, at the beginning of the study and after two weeks.
- Data was collected from the control group first then from the study group to avoid sample contamination.
- Comparison between the two groups was made to assess the effect of compression stockings on morning sickness during pregnancy.

Ethical consideration:

For each recruited subject the following issues were considered: subject's informed consent, privacy, data confidentiality and the right to withdraw at any time.

Statistical analysis:

Statistical analysis was done by the researcher after collection of data by using Statistical Package for Social Sciences (SPSS) version 20 program. A descriptive and analytical statistics were utilized such as frequency distribution table, percentages, means and standard deviations. Comparison between study and control group was done by using Chi-square-test and fisher exact test. A P-value at ≤ 0.05 was considered significant.

Results

As shown in table (1), no statistically significant difference was noted between the study and control groups in relation to their socio-demographic characteristic.

Considerable proportions (42.5 %, 30%) of study and control groups respectively were aged between 20 - 25 years, which is the safe reproduction period. In addition, 17.5 % & 12.5% from study and control respectively were illiterate. Moreover, 75% of the study groups were working compared to 57.5% of the control group.

Table (2) reveals that no statistically significant difference was noted between the study and control group in relation to the present history of morning thickness. Regarding the beginning of morning sickness, more than one half (57.5%) of study subjects started nausea and vomiting from week to less than 8 week compared to more than two fifth (47.5%) among the control group. The majority (82.5%) of the study subjects reported that nausea and vomiting affected their daily activity compared to less than two third (65%) of the control group. In relation to the types of activities which were affected by morning thickness, it was found that 51.5% and 26.9% among study and control group respectively reported cooking. Furthermore, more than two-fifth (42.5%) of the study subjects didn't perform anything to relieve nausea and vomiting compared to 52.5% of control group. Only 12.5% and 15% of the study and control group respectively reported that the source of their information about morning sickness was doctors and nurses.

As illustrated in table (3), before intervention 62.5 % and 55% of the study and control group respectively experienced severe nausea. After intervention, severe nausea was decreased to 0.0% among the study

group compared to 17.5% of the control group respectively. Additionally, it was observed that 47.5% of the study group experienced mild nausea compared to only 25% of control group after two weeks of intervention. A highly statistically significant difference was observed between pre and post intervention study group scores ($P=0.001$) and between study and control group post intervention scores ($P=0.000$)

Table (4) represents the intensity of vomiting among the two groups. It can be observed that, before intervention 67.5 % and 62.5% of the study and control groups respectively experienced severe vomiting. After intervention severe vomiting was decreased to 0.0% among the study group compared to 7.5% among the control group respectively. There was a highly statistically significant differences after two weeks intervention between the study and control group, $P=0.000$.

As shown in table (5), there was severe effect of morning sickness on women's quality of life among both study and control group before intervention (77.5% and 75%) respectively. However, there was greater improvement after the period of compression among the study group and there was a statistically significant differences between the study and control groups post intervention, $P=.000$.

Table (6) shows that compression significantly reduced the total PUQE. Scores as before the intervention 50 % and 70% of the study and control groups respectively had experienced severe unique emesis and vomiting which decreased after intervention to 0.0%

among the study group compared to 47.5% among the control group. There was a highly statistically significant

difference after two weeks of intervention between the two groups, (P=0.000).

Table (1): Distribution of the pregnant women according to general characteristics

Socio-demographic characteristics	Group				F, X ² (P)
	Study (40)		Control (40)		
	N	%	N	%	
Age					
- 16 ≤ 20	13	32.5%	21	52.5	3.994 (.262)
- 20 ≤ 25	17	42.5%	12	30	
- 25 ≤ 30	9	22.5%	7	17.5	
- 30 +	1	2.5%	0	0	
Level of education:					
- Illiterate	7	17.5	5	12.5	5.774 (.217)
- Read and write	12	30.0	13	32.5	
- Preparatory school	8	20	3	7.5	
- Primary school	9	22.5	17	42.5	
- Secondary school	4	10	2	5	
Occupation					
- Working	30	75	23	57.5	2.739 (0.098)
- Housewives	10	25	17	42.5	
Original Residence:					
- Rural	18	45	14	35	0.833 (0.361)
- Urban	22	55	26	65	

²(P): Chi-Square Test & P for ²Test F (P):Fisher Exact test & P for F Test

*: Significant at P ≤ 0.05

Table (2): Distribution of the pregnant women according to their present history of morning sickness

History of morning sickness	Study Group (G1)		Control Group (G2)		F/X ² (P)
	No (n=40)	%	No (n=40)	%	
Beginning of morning sickness					
- From week - <8 week	23	57.5	19	47.5	1.024 (0.599)
- From 8 - 11 week	11	27.5	12	30	
- I don't know	6	15	9	22.5	
Effect of morning sickness on daily activities		82.5	26	65	2.096 (.148)
- Yes	33	17.5	14	35	
- No	7				
If answer yes, which type of activities	17	51.5	7	26.9	3.653 (.161)
- Cooking	21	36.4	14	53.8	
- House cleansing	4	12.1	5	19.3	
- Climb the ladder					
Women's measures to overcome morning sickness					.808 (.668)
- Nothing	17	42.5	21	52.5	
- Eat salt and using lemon	16	40	13	32.5	
- Try to vomit	7	17.5	6	15	
Sources of information about morning sickness					5.701 (.127)
- Mother and mother law	20	50	13	32.5	
- Relative and friends	15	37.5	17	42.5	
- Doctor and nurse	5	12.5	6	15	
- Daya	0	0	4	10	

²(P): Chi-Square Test & P for ²Test F (P):Fisher Exact test & P for F Test

*: Significant at P ≤0.05

Table (3): Distribution of the pregnant women regarding intensity of nausea

Visual Analog Scale (VAS) (intensity of nausea)	G1 (Study)				G 2 (control)				$\chi^2(p)$
	Before intervention		After 2 week of intervention		Before intervention		After 2 week of routine care		
	N	%	N	%	N	%	N	%	
	40		40		40		40		
No nausea	0	0	16	40	0	0	0	0	Test of significant between groups before intervention $\chi^2=.464$ $P=(.496)$
Mild (1-3)	0	0	19	47.5	0	0	10	25	
Moderate (4-6)	15	37.5	5	12.5	15	45	23	57.5	
Severe(7-10)	25	62.5	0	0	22	55	7	17.5	Test of significant between groups after intervention $\chi^2=37.365$ $P=(.000)**$
(P-value)	$\chi^2=47.2505$ ($P=0.001$)**				$\chi^2=0.009$ $P=(.9245)$				

²(P): Chi-Square Test & P for χ^2 Test *: Significant at $P \leq 0.05$

Table (4): Distribution of the pregnant women regarding intensity of vomiting

Visual Analog Scale (VAS) (intensity of vomiting)	G1 (Study)				G 2 (Control)				$\chi^2(p)$
	Before intervention		After 2 week of intervention		Before intervention		After 2 week of routine care		
	N	%	N	%	N	%	N	%	
	40		40		40		40		
No vomiting	0	0	19	47.5	0	0	0	0	Test of significant between groups before intervention $\chi^2=.220$ $P=(.639)$
Mild (1-3)	0	0	16	40	6	15	8	20	
Moderate (4-6)	13	32.5	5	12.5	9	22.5	9	22.5	
Severe (7-10)	27	67.5	0	0	25	62.5	23	57.5	Test of significant between groups after intervention $\chi^2=42.00$ $P=(.000)**$
Test of significance	$\chi^2=56.844$				$\chi^2=0.535$				
(P-value)	(P=.000)**				(P=0.765)				

²(P): Chi-Square Test & P for χ^2 Test *: Significant at $P \leq 0.05$

Table (5): Distribution of the pregnant women according to their nausea and vomiting quality of life (NVQL)

Effect on quality of life	G1 (experimental)				G 2 (control)				$\chi^2(p)$
	Before intervention		After 2 week of intervention		Before intervention		After 2 week of routine care		
	N	%	N	%	N	%	N	%	
	40		40		40		40		
Mild effect (less than 20)	0	0	18	45	0	0	1	2.5	Test of significant between group before intervention $\chi^2=.069(.793)$
Moderate effect (20 to less than 40)	9	22.5	22	55	10	25	12	30	
Severe effect (from 40 to 60)	31	77.5	0	0	30	75	27	67.5	Test of significant between group after intervention $\chi^2=32.211(.000)**$
Test of significance	$\chi^2=49.16$				$\chi^2=0.253$				
(P-value)	(P=.000)**				P=(0.881)				

²(P): Chi-Square Test & P for ²Test *: Significant at P ≤ 0.05

Table (6): Distribution of the pregnant women according to the score of pregnancy unique of emesis and vomiting

Score of pregnancy unique emesis and vomiting	G1 (experimental)				G 2 (control)				$\chi^2(p)$
	Before intervention		After 2 week from intervention		Before intervention		After 2 week from routine care		
	N	%	N	%	N	%	N	%	
	40		40		40		40		
Mild (more than 6)	0	0	15	37.5	0	0	1	2.5	Test of significant between group before intervention $\chi^2=3.333 (.068)$
Moderate (from 7 to 12)	20	50	25	62.5	12	30	20	50	
Severe more than 13	20	50	0	0	28	70	19	47.5	Test of significant between group after intervention $\chi^2=31.806(.000)*$
Test of significance	Chi-square test $\chi^2=38.44$				Chi-square test $\chi^2=3.33$				
(P-value)	P=(0.000)**				P=(0.678)				

²(P): Chi-Square Test & P for ²Test *: Significant at P ≤ 0.05

Discussion

Most pregnant women experience pregnancy-related conditions, of which morning sickness is one of the most common. Nausea affects approximately 70-80% of the pregnant women, and additional vomiting is experienced by about 50% (**Einarson et al., 2013; Piwko et al., 2013**). In general, NVP is not associated with increased risk of adverse pregnancy outcomes, it imposes significant negative impact on the women's lives. Successful treatment of nausea and vomiting will improve the pregnant women's quality of life. Moreover, therapies used in early pregnancy should be safe and do not lead to any complications (**Wood et al., 2013**). Very limited studies were performed related to non-pharmacological treatment of NVP. So, this study aimed to assess the effect of compression stockings on morning sickness among primigravidas. The results of the present study achieved its hypotheses in demonstrating that wearing compression stockings two weeks in early pregnancy during the day significantly improved all NVP-related parameters.

The symptoms of nausea and vomiting may cause emotional distress and interfere with a woman's ability to maintain her daily routines and responsibilities, including familial commitments, work and social obligations (**Clark et al., 2013**). From the results of the present study, it can be observed that, a large proportion of women from both groups who had nausea and vomiting reported that they

were unable to perform their daily activities related to domestic life as cooking and cleaning. This is because nausea and vomiting have a negative impact on daily life functioning. The results are in accordance with **Heitmann et al., 2017** who demonstrated that NVP had adverse effects on women's daily lives, such as caring for children, relationship with partner and work productivity. A study was conducted by **Vakilian et al., 2019** about the relationship between nausea and vomiting with general and psychological health of pregnant women reported that high intensity of nausea and vomiting

caused more problems on the physical function of women and more restrictions on daily activities.

Although, nausea and vomiting are common in early pregnancy, their presence may be minimized by obstetricians, other obstetric care providers, and pregnant women and, thus, undertreated (American College of Obstetricians and Gynecologists, ACOG, 2018). In the present study, despite the worse effects of nausea and vomiting, large percent of women from both groups did not do something for these problems or even seek medical help. This may be due to fear of using medication during pregnancy because of their adverse effects on the developing fetus that limit their use.

The severity of morning sickness may range from mild nausea to unrelenting nausea with or without retching and/or vomiting that can occur

day or night and often persists throughout the day (**Kramer et al., 2013**). As shown in the present study, more than one half from each group suffered from severe nausea and vomiting before intervention, however, these results are contradicted with the results of a study carried out by **Tan et al., 2018** who found that the majority of women had moderate NVP. These results may be due to nausea and vomiting of pregnancy is a common condition that affects about 70% of pregnant women with varying severity (**Fejzo et al., 2019**). Also, in the current study, there is a significant improvement among the study group related to decrease in the severity of nausea and vomiting after intervention. The possible modes of action of leg compression early in pregnancy may be due to that, in the first trimester of pregnancy blood volume is increased and there is a relative Hemoglobin decrease. The vein wall suffers relaxation from the pregnancy hormones. Compression reduces the calf vein filling, thus keeping the circulating blood volume higher, brain and possibly digestive organs could benefit from this (**Mendoza and Amsler, 2017**).

Moreover, according to the present study, the quality of life was significantly associated with the severity of NVP. Severe nausea and vomiting before intervention among both groups affect women's quality of life to a great extent. Furthermore, after the intervention, there is an improvement in the quality of life as the percent of women who have severe nausea and vomiting become zero after intervention among the study group.

Major effect of NVP on the women's quality of life has demonstrated in another studies by **Lacasse et al., 2008; Clark et al., 2013 and Mitchell et al., 2017**. They reported that NVP diminished QOL, with scores on the NVPQOL worsening as the severity of NVP increased. In a study which was carried out by **Bai et al 2016**, pregnant women with a combination of nausea, vomiting and fatigue reported a relative low health related quality of life (HRQOL) in both the physical and mental domains. The presence of symptoms and the impact on HRQOL may affect the ability of women in early pregnancy to cope with demands in the workplace and other daily activities.

According to the clinical severity by PUQE, the results of the current study showed a significant reduction in the severity of nausea and vomiting among the study group two weeks after applying the compression stockings. Women in the experimental group reported that wearing compression stockings helped to relieve the symptoms of NVP. However, these results are in consistent with the results of **Mendoza and Amsler, 2017** who reported that compression resulted in a greater improvement than no compression. The clinical guidelines recommend that during pregnancy, women should wear compression stockings to prevent or treat venous edema and varicose veins (**National Institute for Health and Care Excellence, 2008; Queensland, 2014; Royal College of Obstetricians and Gynaecologists, 2015**).

In a study carried out by **Allegra**

et al., 2014 who investigated the effects of compression stockings on venous functional symptoms and quality of life. They found that use of compression stockings significantly relieved leg pain and improved QoL as assessed by the Chronic Venous Disease Quality of Life (CIVIQ) questionnaire. Moreover, compression decreases the blood volume remaining in the calf veins and possibly improving brain perfusion (Blazek et al., 2013 and Mendoza et al., 2014). These results might indirectly influence the feeling of nausea. However, these explanations are speculative, and the mechanism whereby compression relieves symptoms is currently unknown (Mendoza and Amsler, 2017). In the same study of Mendoza and Amsler, 2017, participants were asked at the end of the 4-week study, 67% confirmed that compression relieved heavy legs, 50% felt that compression helped against nausea, 62% will wear compression stockings again, and over 80% would advise wearing compression stockings during early weeks of pregnancy.

Conclusion

From the results of the current study, it can be concluded that morning sickness decreased among women who used compression stockings for two weeks during early pregnancy. Moreover, quality of life was significantly decreased according to severity of NVP. In addition, morning sickness was also associated with negative effects on various aspects of daily life functioning

Recommendations

1. Emphasize the use of compression stockings in the non-pharmacological protocol for the treatment of NVP as an effective strategy for such a problem.
2. Further researches should be conducted on a large number of pregnant women from different geographical areas in Egypt to enlighten the mechanisms of elastic stockings in relieving morning sickness.

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