

The Effect of Counseling on Hemoglobin, Hematocrit and Weight Gain in Teenage Pregnant Women: A Randomized Clinical Trial

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Abstract

Background

Pregnant women's health is a major health priority in all countries. Teenage pregnancies can be high-risk. This study was conducted to determine the effect of counseling on hemoglobin, hematocrit and weight gain in teenage pregnant women.

Materials and Methods

This randomized, controlled, clinical trial was conducted on 120 teenage women with a gestational age of 20 to 24 months presenting to medical centers in Ardabil, Iran, in 2016 to 2017. The participants were assigned to a counseling (n=60) and a control (n=60) group through randomized blocked sampling. The intervention group received counseling on self-care, symptoms and risks of teenage pregnancy and methods for its prevention in five 60-minute sessions and booklets were distributed among them, too. Each woman and her husband received private counseling in the last session based on their questions and problems. The control group received routine care. Hemoglobin and hematocrit levels and weight at the beginning of pregnancy and before delivery were evaluated. The independent t-test and ANCOVA with adjusted baseline values were used to analyze the data.

Results: The two groups did not differ significantly in terms of demographic details, except the mother's age and baseline hemoglobin and hematocrit levels ($P>0.05$). There were no significant differences between the two groups after the intervention (with adjusted baseline values) in terms of hemoglobin (adjusted mean difference: -0.07, 95% confidence Interval: 0.31 to -0.46, $P=0.710$), hematocrit (-0.14, 0.76 to -1.05, $P=0.747$), and pregnancy weight gain (0.07, 1.80 to -1.65, $P=0.931$).

Conclusion

The results showed that providing counseling to teenage women during pregnancy does not affect their hemoglobin and hematocrit levels and pregnancy weight gain.

Key Words: Adolescent, Counseling, Hematocrit, Hemoglobin, Pregnancy, Weight gain.

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1- INTRODUCTION

The health of pregnant women has a significant effect on society general health and this vulnerable group should always be supported and trained and receive appropriate health services (1). Age is a known risk factor in pregnancy. The best age for pregnancy is 20 to 29 years, and pregnancy in ages outside this range is associated with more complications and disorders. In statistical surveys, pregnancies outside the age range of 18 to 35 years are considered high-risk (2-4). Teenage pregnancy is an instance of high-risk pregnancy that has different prevalence rates in different societies and cultures. Based on a World Health Organization (WHO) definition, adolescence (teenage) refers to the age range of 11 to 19 years, and pregnancy in this age range is examined as adolescent pregnancy (5, 6). Teenage pregnancy is increasing in prevalence. According to a World Health Statistics report, the rate of childbirth in teenage girls was 49 per 1000 births in 2014. Overall, 2 million out of the 3.7 million teenage girls who become mothers for the first time are under the age of 15, and if this trend continues, the number of women bearing child at ages less than 15 will rise to 3 million per year by 2030 (7).

One of the physiological changes occurring during pregnancy is an increase in blood volume (8), and the increased plasma volume (50%), and red blood cell volume (18%) in the middle of pregnancy results in the dilution of the blood and thereby a reduction in hemoglobin levels (9). The normal range of hemoglobin in healthy non-pregnant women is 12-16 g/dl, and the changes in blood volume reduce the concentration of hemoglobin in the blood by almost 2 g/dl in pregnant women (the WHO defines anemia as a hemoglobin level less than 11 g/dl) (10). In pregnant women below age 18 years, the need for iron increases due to the synergistic effects

of their growth needs and pregnancy needs (9, 11), and in the absence of sufficient iron stores, a significant drop occurs in hemoglobin (12). Some findings indicate an increased risk of low-birth-weight (LBW) following a drop in blood hemoglobin levels (13); however, some studies have not found any correlations between these two factors (14). The mother's low or high hematocrit levels can affect pregnancy outcomes (15). The previous studies showed a relationship between severe anemia and adverse pregnancy outcomes (16, 17); however, the relationship between moderate anemia (a 25-34% level of hematocrit), and pregnancy outcomes is still unclear (18, 19). The appropriate weight gain for pregnant adolescents is calculated based on their pre-pregnancy body mass index (BMI), and mean (standard deviation) 317 (110) gr per week have been recommended (20). The BMI and pregnancy weight gain play an important role in pregnancy outcomes and are known as important predictors of maternal and neonatal morbidity and mortality (21). Lao et al. performed a study on 613 adolescent pregnant women in Hong Kong and showed that the mothers' BMI correlated with adverse maternal and neonatal outcomes (22).

Numerous studies have revealed a strong correlation between maternal weight gain and neonatal birth weight (23, 24). According to the results obtained by a group of researchers, the mother's age, weight, number of pregnancies and duration of pregnancy correlate directly with birth weight (11, 25). Some other researchers have found low birth weight to be caused by an unfavorable socioeconomic status, poor maternal nutrition and low levels of blood hemoglobin and hematocrit in the mother (24, 26). Adolescent pregnant women often do not get adequate prenatal care due to their failure to have regular doctor

visits. An insufficient knowledge, poor nutrition and age below 18 years are important determinants of a low birth weight (27). Reron et al. (28) argued that adolescent pregnant women do not make major changes in their diet due to their poor knowledge about the significance of a healthy diet during pregnancy. According to the results obtained by Mersar et al. (29) on the effects of prenatal counseling on adolescent pregnancy outcomes, a lack of knowledge, acceptance and health behavior promotion was observed in both the intervention and control groups before the intervention, but the intervention group progressed significantly after the intervention. Prenatal counseling and training should be adequately provided for achieving positive maternal and neonatal outcomes (30, 31). Counseling for health promotion and disease prevention and timely treatment are essential parts of a health system's performance (32).

Increasing pregnant women's awareness about the difficulties of pregnancy can affect pregnancy outcomes. Studies show that providing counseling to the mother and even her husband in each prenatal visit is the most effective method for raising awareness in this area (33). Health service providers empower patients through counseling and solve many of their problems through communication and increased self-confidence (34). Studies show a significant reduction in pregnancy complications following prenatal care and counseling (31). Given their role as counselors and vital first-line health care providers, midwives can communicate with different groups of women to understand their problems and give them counseling to solve these problems, precisely due to their knowledge of women's problems and counseling techniques (32). The present study was conducted to determine the effect of counseling on certain pregnancy outcomes (hemoglobin and hematocrit and

pregnancy weight gain) in teenage pregnant women.

2- MATERIALS AND METHODS

2-1. Study design and participants

This randomized, controlled, clinical trial with two parallel groups was conducted on 120 teenage pregnant women presenting to health centers in Ardabil city, Iran, for receiving prenatal care. The inclusion criteria were: teenage pregnant women (aged 11 to 19 years), gestational age of 20 to 24 weeks, singleton pregnancy, first to third pregnancy, a contact number for follow-ups, an Edinburgh depression score (35). The exclusion criteria were: underlying diseases (cardiovascular diseases, blood pressure, diabetes and psychological diseases), a history of hospitalization for current pregnancy complications, diagnosis of fetal abnormalities, people who could not speak in native language and withdrawal from participation while completing the questionnaire. The sample size was calculated in G-Power based on the two variables 'pregnancy weight gain' and 'hemoglobin level' based on the results of a study by Kalhor et al. (36). The sample size calculated based on the mother's weight gain was larger, and considering $sd_1=sd_2=5.09$, $m_1=12.3$, $m_2=14.76$, test power=90%, and $\alpha=0.05$, it was determined as 54 per group; ultimately, 60 people were assigned to each group to take account of a potential sample loss of 10%.

2-2. Sampling

Sampling was performed after obtaining the approval of the Ethics Committee of the Research and Technology Deputy of Tabriz University of Medical Sciences (Ethics Code: TBZMED.REC.1396.104), and registering the study at the Iranian Registry of Clinical Trials (Code: IRCT201705146582N 26) from February to September 2017. To select participants

from all the health centers of Ardabil, one-third of the centers (n=20) were randomly selected, and an appropriate number of samples was calculated for each center in proportion to the initial sample size of 60 per group. The researcher visited the health centers and specified the number of all the women who had visited the centers for receiving prenatal care at weeks 20 to 24 of gestation based on the pregnancy care records available in the midwifery unit of the centers. The researcher then called the women using the telephone number registered in their medical records and invited them to participate in the study after briefing them on the research.

The women were given the researcher's telephone number to arrange a date and time for their visit to the health centers. In the visits, the women were first examined for their general information and eligibility criteria. The eligible women were then further briefed on the study objectives and methods and were ensured of the confidentiality of their data and were invited to participate in the research. An informed consent was obtained from those who were willing to participate. The participants completed a demographic questionnaire and the Edinburgh Depression Scale (35, 37). The women with an Edinburgh depression score lower than 12 were included in the study and those with a score of 12 or higher were referred to a psychiatrist. The women's hemoglobin and hematocrit levels in early pregnancy and weight in the first trimester of pregnancy, which were recorded in their medical records, were noted in the researcher's checklist. The Edinburgh questionnaire has 10 items based on a 4-point Likert scale. To each question, this questionnaire is based on the answer given, the score is 0 to 3; therefore, the minimum score is zero and the maximum score is 30. In this research, a score of more than 12 is considered as depression (37). This questionnaire is a reliable tool

for measuring postpartum depression (35). In Iran, the credibility of this questionnaire was measured by Montazeri et al. The validity coefficient was 70% based on Cronbach's alpha and 80% of the internal correlation of the test was reported (37).

2-3. Randomization

The participants were assigned to counseling and a control group through randomized blocks of four and six and with the allocation ratio of 1:1. A person not involved in the sampling performed the blocking. The type of intervention was typed up on a piece of paper and put inside opaque envelopes numbered consecutively (concealed allocation). The envelopes were opened in the order by which the participants visited the health centers and the groups were thus determined.

2-4. Intervention

The intervention group received routine care provided in the health centers and received group counseling about self-care, symptoms and risks of teenage pregnancy and methods for its prevention in five 60-minute sessions at the conference rooms of Ardabil health centers, too (**Table.1**). The counseling groups were made up of five to nine participants. The content of each session was in line with participants' gestational age and their needs at the time. In the first session, the group members were introduced to each other as well as to the researcher and were informed of the number and time of the sessions; then, pregnancy and the factors affecting it were discussed. Physiological and hormonal changes of pregnancy, vaccination and proper breathing techniques were explained to the groups in the second session. The third session was dedicated to a discussion of nutrition, personal hygiene, oral hygiene, exercising during pregnancy and proper breathing. In the fourth session, the participants were familiarized with the symptoms, risks and complications of teenage pregnancy (preterm childbirth, low

birth weight, intrauterine growth restriction, etc.), breastfeeding techniques and breathing during labor. In the fifth session, they were familiarized with the warning signs of the onset of labor pain, the type of childbirth and family planning. Each woman and her husband received private counseling in the last session based on their questions and problems. Also, the intervention group received an instructional booklet at the end of the study. The researcher's telephone number was also given to them to ask any potential questions. The control group and recapitulation the last sessions.

Once the counseling sessions were over, arrangements were made with both the counseling and control groups to get hospitalized at Alavi and Social Security hospitals of Ardabil city for delivery. Once the mothers were hospitalized for childbirth, a researcher who was unaware of the group allocations visited the mothers in the delivery room in order to measure their hemoglobin and hematocrit while going into labor; for measuring the mothers' weight at childbirth, their weight when presenting for delivery was recorded in the case of the preterm childbirths, and in the case of the term childbirths, the mothers' weight at the 38th week of gestation was recorded in the checklist.

2-5. Data Collection Instruments

Data were collected using a demographic questionnaire and a researcher-made checklist for recording the hemoglobin and hematocrit levels at baseline and before delivery as well as the mother's weight in early pregnancy and at week 38 of pregnancy (or upon hospitalization for delivery in the case of preterm childbirths). The demographic questionnaire inquired about participants' age, education, occupation, husband's education and occupation, income adequacy and place of residence. The questionnaire's validity was examined through the content and face validity methods. The primary of

hemoglobin and hematocrit levels was extracted from their medical records which were measured using standard automatic device Sysmex K-1000, made in German. For measuring their hemoglobin and hematocrit while going into labor, 2 ml blood samples were obtained by researcher and analyzed by a constant person in a laboratory with SysmexK-1000 German standard. All experiments were carried out with this device. To measure the reliability of the tests, the first 20 samples were assessed by two laboratory experts independently and inter-rater correlation were determined and confirmed. Based on the definition provided by the Centers for Disease Control and Prevention (CDC), the hemoglobin less than 11 g/dl in the first and third trimesters was considered a case of anemia (11).

The gestational age was determined based on two methods: The Last Menstrual Period (LMP) reported by the mothers, and an ultrasound report from the early pregnancy. If the difference between the results offered by the two methods was larger than two weeks, the ultrasound result marked the subject's gestational age; otherwise, the LMP result was taken as the standard (38). The mothers' initial weight was recorded by referring to their health card, and the final weight of the women with preterm birth was measured using a standard scale in the maternity ward. A beam balance scale was used to measure the women's weight in light clothing and then 1.5 kg were subtracted to account for the clothes' weight (23).

2-6. Data Analysis

After collection and ensuring their proper entry into the software, the data were analyzed using SPSS software version 21.0 by descriptive statistics (frequency, percentage, mean and standard deviation) and inferential statistics. The normality of the quantitative data was confirmed using the Kolmogorov-Smirnov test. The independent t-test was used to compare the

Table-1: The content of the consultation sessions for the intervention group.

Time	The content of each session	Number	Participants	References
First session	The group members were introduced to each other as well as to the researcher and were informed of the number and time of the sessions; then, pregnancy and the factors affecting it were discussed.	Five to nine	Teenage pregnant women	Capuzzi D, Theories of counseling and psychotherapy: Systems, strategies, and skills: 2013. Seligman LW Counseling and psychotherapy: Theories and interventions: 2016.
Second Session	Physiological and hormonal changes of pregnancy, vaccination and proper breathing techniques were explained.	Five to nine	Teenage pregnant women	Smith J. Myles Textbook for Midwives. Taylor and Francis; 2010.
Third Session	Dedicated to a discussion of nutrition, personal hygiene, oral hygiene, exercising during pregnancy and proper breathing.	Five to nine	Teenage pregnant women	Berk L. Development through the lifespan-Brayshaw E. Exercises in pregnancy and childbirth: a practical guide for educators.
Fourth Session	The participants were familiarized with the symptoms, risks and complications of teenage pregnancy (preterm childbirth, low birth weight, Intrauterine growth restriction, etc.), breastfeeding techniques and breathing during labour.	Five to nine	Teenage pregnant women	Burroughs A, Leifer G. Maternity nursing: an introductory text Kao A. Treatment conduction disease. Creasy et al. Maternal fetal medicine: principles and practice. Alden et al. Maternity and Women's Health Care-E-Book: 2013.
Fifth Session	They were familiarized with the warning signs of the onset of labour pain, the type of childbirth and family planning. Each woman and her husband received private counselling in the last session based on their questions and problems.	Two	Woman and her husband	Levy et al. Maternal anemia during pregnancy is an independent risk factor for low birthweight and preterm delivery. 2005.
Table intervention tailoring in controll group				
Time	The content of each session	Number	Participants	References
Care 1 (Week 6- 1)	Personal hygiene, mental, sexual, oral hygiene, nutrition, Drug supplements, cigarette and tobacco, alcohol, signs of disease, common complaint consulting and counselling for the screening of chromosomal diseases.	One	Teenage pregnant women	Chestnut et al. Chestnut's Obstetric Anesthesia: Principles and Practice E-Book: Elsevier Health: 2014 Douketis et al. Perioperative management of antithrombotic therapy: antithrombotic therapy and prevention of thrombosis: American College of Chest Physicians evidence-based clinical practice guidelines. Chest. 2012.
Care 2 (Week 16-21)	Recommendation for participation in the childbirth class and recapitulation the last session, proper breastfeeding.	One	Teenage pregnant women	
Care 3 (Week22- 31)	Recommendation for participation in the childbirth class and recapitulation the last sessions.	One	Teenage pregnant women	
Care 2 and 5 (Week 31- 32 , 35- 37)	The benefits of natural and safe delivery, maternity and proper delivery. Benefits of breastfeeding, baby care, neonatal risk and recapitulation the last sessions.	One	Teenage pregnant women	Shufelt CL, Manson JE, American College of C. Statin therapy in women. 2014. James et al. High Risk Pregnancy E-Book: Management Options-Expert Consult: 2010.
Care 6 to 8 (Week 38-21) Take care every week	Signs of danger, Common complaints, signs of labour, Safe delivery benefits, place of delivery. The next pregnancy time, baby care and neonatal symptoms and recapitulation the last sessions.	One	Teenage pregnant women	Cunningham et al Williams Obstetrics. 22nd ed. 2010.
The control group received all routine pregnancy training that was provided shortly (at most 5 minutes, asked and written) for each midwifery visit that was only taught and not counselling.				

two groups in terms of quantitative variables including the mother's age, gestational age at baseline and gestational age at birth; the linear-by-linear Chi-square test was used to compare them in terms of the mother's education, husband's education and income status, and Fisher's exact test was used to compare them in terms of the mother's occupation, husband's occupation and housing status. The independent t-test was used to compare the groups in terms of their hemoglobin and hematocrit levels and weight in early pregnancy, and the ANCOVA with adjusted baseline values was used to compare them in terms of their hemoglobin and hematocrit levels and weight before delivery. P-values less than 0.05 were considered statistically significant. All the analyses were performed based on the intention-to-treat.

3- RESULTS

This study was conducted to determine the effect of counseling on hemoglobin and hematocrit levels and weight gain in teenage pregnant women. Of the 269 adolescent pregnant women, 126 did not meet the inclusion criteria and were thus excluded from the study. The Edinburgh Depression Scale was completed for the participants through an interview at the beginning of the study, and the results were then analyzed, and the women with depression scores less than 12 were included in the study. A total of 23 women had scores of 12 and higher and were thus excluded from the study and referred to a psychiatrist; and 120 women with scores less than 12 remained and were assigned into two groups of 60. There was no sample loss in either of the groups and all the 120 women were followed up with until the end of the study (**Figure.1**). The two groups were not significantly different in terms of demographic details, except for the mean age ($P=0.002$). The mean age (standard deviation [SD]) was 18.2 (1.0) years in the case group and 17.6 (1.3) in

the control group. Most of the participants in both groups (65% in the case group and 53.3% in the control group) had a high school diploma. As for their occupation, most of the participants in both groups (96.7% in the case group and 98.3% in the control group) were housewife. Almost one-third of the participants in both groups owned a house (33.3% in the case group and 38.3% in the control group). The husbands of more than one-third of the women in the intervention group (38.3%) and more than half of the women in the control group (60%) were laborers.

The husbands of about half of the women in both groups (45% in the case group and 46.7% in the control group) had a high school diploma. As for monthly income adequacy for living expenses, 56.7% of the intervention group and 46.7% of the control group were somewhat satisfied with their current economic status (**Table.2**). At baseline, the mean (SD) gestational age of the women was 153.83 (10.10) days in the intervention group and 152.86 (9.70) days in the control group based on the ultrasound in early pregnancy. At delivery, the mean (SD) gestational age of the women was 271.86 (13.60) days in the intervention group and 275.21 (11.61) days in the control group, suggesting no significant differences between the two groups.

In early pregnancy, the mean (SD) weight was 59,350 (9.34) gr in the control group and 59,620 (9.45) gr in the counseling group. The results of the independent t-test did not show a significant difference between the two groups in terms of the women's mean weight in early pregnancy ($P=0.873$). Before delivery, the women's mean (SD) weight was 71,020 (9.31) gr in the control group and 71,180 (9.30) gr in the counseling group. Based on the results of the ANCOVA with adjusted baseline values and adjusted age, there was no significant difference between the groups in terms of the women's weight before

delivery (the adjusted mean difference=0.07, 95% Confidence Interval [CI]: 1.80 to -1.65, P=0.931). Before the intervention, the mean (SD) hemoglobin level was 12.13 (1.29) g/dl in the control group and 12.60 (0.83) g/dl in the counseling group. The results of the independent t-test showed a significant difference between the two groups in terms of the mean concentration of hemoglobin in early pregnancy (P=0.01). At delivery, the mean (SD) concentration of hemoglobin was 11.82 (1.44) g/dl in the control group and 12.20 (0.94) g/dl in the counseling group. According to the ANCOVA with adjusted baseline values and adjusted age, there was no significant difference between the groups in terms of hemoglobin levels at delivery (adjusted

mean difference = -0.07, CI95%: 0.31 to -0.46, P=0.710). Before the intervention, the mean (SD) concentration of hematocrit was 36.53 (3.06) in the control group, and 37.57 (2.56) in the counseling group. The results of the independent t-test showed a significant difference between the two groups in terms of the mean concentration of hematocrit in early pregnancy (P=0.046). At delivery, the mean (SD) concentration of hematocrit was 35.62 (3.27) in the control group, and 36.23 (2.43) in the counseling group. According to the ANCOVA with adjusted baseline values and adjusted age, there was no significant difference between the groups in terms of hematocrit levels at delivery (adjusted mean difference= -0.14, 95% CI: 0.76 to -1.05, P=0.747) (**Table.3**).

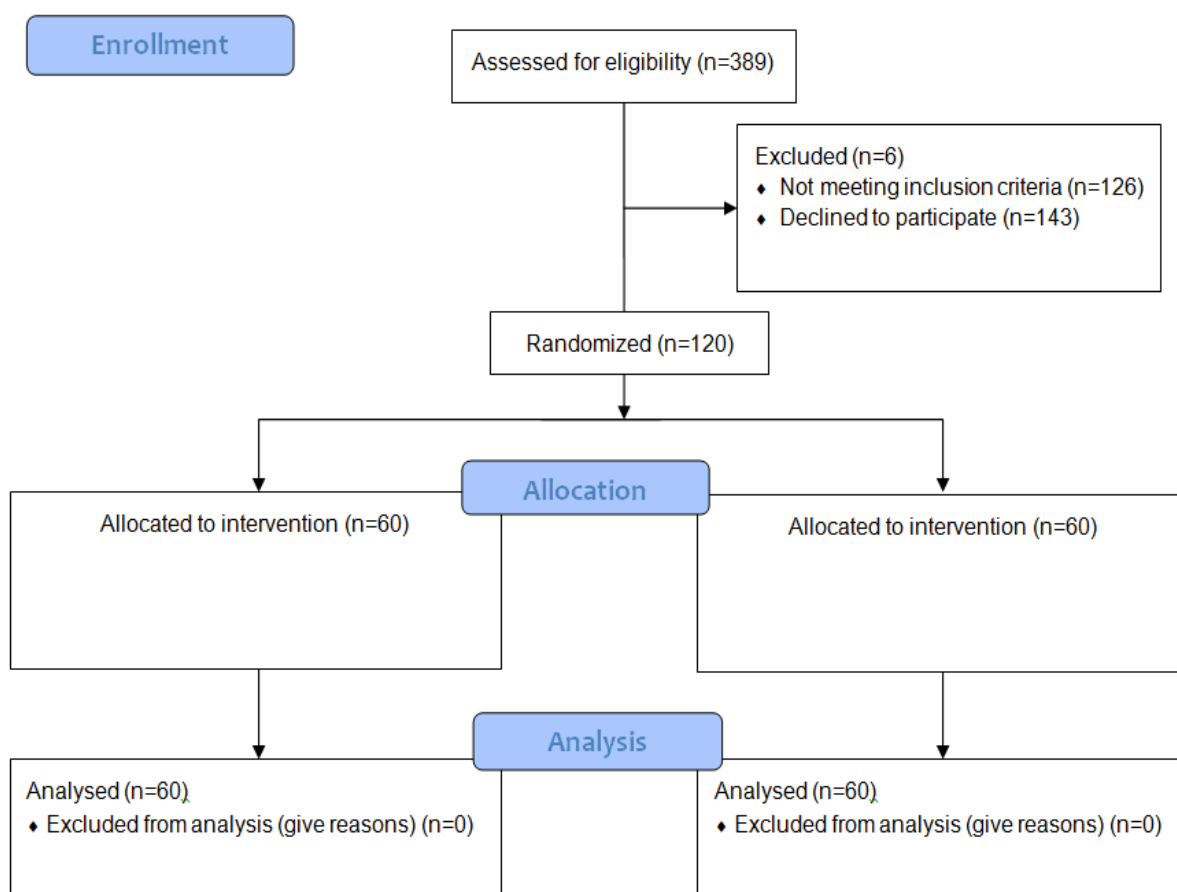


Fig.1: Flowchart of the study.

Table-2: Socio-demographic characteristics of the participants in two groups.

Socio-demographic characteristics	Counselling group n=60	Control group n=60	P-value
Age (year)	18.25 (0.98)	17.58 (1.30)	0.002
Gestational age at the imported	153.83 (10.10)	152.86 (9.70)	0.594
Gestational age at the childbirth	275.21 (11.61)	271.86 (13.60)	0.150
Level of Education			0.076
Primary school	6 (10)	4 (6.7)	
Secondary school	9 (15)	23 (38.3)	
Diploma	39 (65)	32 (53.3)	
University	6 (10)	1 (1.7)	
Participant's job			1.0
Housewife	58 (96.7)	59 (98.3)	
Employed	2 (3.3)	1 (1.7)	
Home status			0.693
Personal	20 (33.3)	17 (38.3)	
Rented home	40 (66.7)	43 (71.7)	
Husband's job			0.062
Unemployed	1 (1.7)	3 (5)	
Employee	3 (5)	3 (5)	
Working	23 (38.3)	36 (60)	
Shopkeeper	4 (6.7)	10 (16.7)	
Other	23 (38.3)	23 (23.3)	
Husband's education level			0.266
Elementary	9 (15)	8 (13.3)	
Secondary school	12 (20)	19 (31.7)	
Diploma	27 (45)	28 (46.7)	
University	12 (20)	5 (8.3)	
Family income			1.0
Enough	19 (31.7)	22 (36.7)	
Quite enough	34 (56.7)	28 (46.7)	
Inadequate	7 (11.7)	10 (16.7)	

Table-3: Comparison of hematocrit, hemoglobin and weight at different time-point in two groups.

Time of assessment	Counseling group n= 60 Mean (SD)	Control group n= 60 Mean (SD)	Comparison Between Groups Counselling with Control Adjusted mean difference (95% CI)	P- value
Hb level (g/dl)				
Before intervention	12.60 (0.83)	12.13 (1.29)	-0.47 (-0.08 to - 0.87)	0.018
Before childbirth	12.20 (0.94)	11.82 (1.44)	-0.07 (0.31 to- 0.46)	0.710
HCT level (g/dl)				
Before intervention	37.57 (2.56)	36.53 (3.06)	-1.04 (-2.06 to -0.01)	0.046
Before childbirth	36.23 (2.43)	35.62 (3.27)	-0.14 (0.76 to -1.05)	0.747
Weight (kg)				
Before intervention	59.62 (9.45)	59.35 (9.34)	-0.27 (-3.67 to 3.12)	0.873
Before childbirth	71.18 (9.30)	71.02 (9.31)	-0.07 (-1.80 to 1.65)	0.931
SD: Standard deviation; 95% CI: 95% Confidence Interval; Hb: Hemoglobin; HTC: hematocrit.				

4- DISCUSSION

This study was conducted to determine the effect of counseling on hemoglobin and hematocrit levels and weight gain in teenage pregnant women. The results showed that counseling does not affect these variables in this group. Based on a review of literature, only one study has been conducted on the effects of providing counseling to women in their third trimester of pregnancy on pregnancy outcomes in Iran. In the study, Delaram et al. (2012) held seven counseling sessions within three months for the intervention group to introduce them to the different stages of natural childbirth, postpartum hygiene, neonatal care, the importance of breastfeeding and family planning, the benefits of natural childbirth, the disadvantages of cesarean section, the signs of the onset of labor, the appropriate time to go to the hospital for childbirth and the problems associated with early hospitalization for both the mother and infant. They also discussed the women's complaints and problems during pregnancy.

The results of the study showed that providing counseling to primiparous women in the third trimester of pregnancy improves maternal outcomes (going to the hospital with the onset of labor pain, increased term childbirth with greater cervical dilatation upon hospitalization, less use of oxytocin, higher frequency of vaginal birth and shortened duration of the first stage of labor) as well as fetal outcomes (the anthropometric index and five-minute Apgar score); (39). Hemoglobin and hematocrit levels and weight gain, however, were not examined in the cited study, and its results cannot be used for this discussion. Thassri et al. (2000) found no significant changes in pregnant women's nutrition after training (40). The ineffectiveness of counseling on women's nutrition is likely generalizable to hemoglobin and hematocrit levels and

weight gain during pregnancy as well, and the findings can thus be said to be consistent with the present findings. Althuisen et al. (2012) examined the effects of counseling on changes in weight during pregnancy and after childbirth in the Netherlands and offered individual counseling on weight, exercise and diet during pregnancy over four 30-minute sessions, with a phone counseling session after delivery and an instructional booklet. The data collected at weeks 15, 25 and 35 of pregnancy and weeks 8, 26 and 52 after childbirth showed no significant differences between the intervention and control groups in terms of pregnancy weight gain and postpartum weight retention (41), as consistent with the present findings. Nielsen et al. (2006) conducted a review study to evaluate the results of 27 clinical, cohort, cross-sectional and case-control trials and offered prenatal counseling to a group of adolescent pregnant women at weeks 15 to 21 by a nutritionist over six to nine sessions and found prenatal counseling to be effective in nutritional information, dietary quality, pregnancy weight gain and birth weight (42). This study was not consistent with the present findings.

This disparity of findings might be due to the participants having been trained by a nutritionist in the cited study, while the subjects in the present study were offered counseling by a midwife. Aashima et al. (2006) conducted a study to determine the effects of counseling on nutrition during pregnancy in Indian women and showed a considerable increase in the quality and quantity of the women's diet, hemoglobin and weight in the intervention group compared to the control group through individual counseling during pregnancy, weekly home visits and nine group sessions held over 10-16 weeks (43). They also proposed that weekly individual counseling can improve nutrition during pregnancy. The disparity of findings

between the cited and the present study may be due to the number of counseling sessions, the weekly home visits and the failure to examine nutrition as a variable. The results of a study by Akter et al. (2012) showed that providing counseling to low-income women in Bangladesh in the third trimester of pregnancy improves their pregnancy weight gain, birth weight and breastfeeding. In the cited study, counseling began at the sixth month of pregnancy and was offered in the form of three nutrition training sessions in the first month and then monthly training and giving a booklet on nutrition until two months after delivery (44). The differences between the cited and the present study include the number and time of the counseling sessions, as the women in the cited study also received postpartum counseling. Akeredolku et al. (2014) showed that nutrition counseling and training can promote mothers' nutritional knowledge significantly and result in the birth of normal-weight infants (45).

Girard et al. (2012) conducted a review study in which they reviewed case-control studies conducted in 1952 to 2010 and showed that nutrition training improves weight gain by 0.45 kg, decreases the risk of anemia by 30%, increases birth weight by 105 gr and reduces the risk of preterm childbirth by 19% in teenage and adult pregnant women (46). The disparity of findings between the cited and the present study may be due to the focus on training and nutrition in the cited study that might have contributed to the effectiveness of the intervention, while the present study focused on a much wider content. The strengths of this study include its new approach to the evaluation of the effects of counseling on hemoglobin, hematocrit and weight gain in teenage pregnant women in Iran. Other strengths of the study include the compliance with the principles of carrying out clinical trials to prevent potential biases, the random selection of

the sampling centers, the randomized allocation of the participants to the study groups, the researcher's personal offering of counseling to all the participants in the intervention group and no sample loss. Pregnant mothers tend to seek a reliable source of information on prenatal care and this need was met in this study through the instructional booklet offered, the telephone follow-ups and the subjects' access to the researcher over the phone. Given the effect of husbands' social support on maternal and neonatal outcomes, allocating one of the pregnancies counseling sessions to talking to the husbands can be considered strength of this study.

4-1. Limitations of the study

One of the limitations of this study was that the researcher didn't evaluate the nutritional status and the quality and quantity of the food items available to the mothers; this limitation is recommended to be resolved in future studies. Moreover, the participants were selected from urban health centers, while rural teenage women may be in more dire need of counseling programs than urban women. Future studies are recommended to provide counseling to teenage women from the first trimester of pregnancy with more sessions, and a larger sample size should also be selected from rural health centers.

5- CONCLUSION

Providing counseling to teenage pregnant women during pregnancy does not affect their hemoglobin and hematocrit levels and pregnancy weight gain. Counseling is an important factor for the prevention of high-risk pregnancies, especially in adolescent women. This study reveals the need for promoting high-quality, need-based, timely health services and health planners and policymakers should consider prenatal counseling for pregnant teenagers a key strategy for improving the outcomes of teenage pregnancies.

6- CONFLICT OF INTEREST: None.

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