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7 **The Effect of Group Prenatal Care on Empowerment of Pregnant Adolescents**

8 *A randomized controlled trial*

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19 **Abstract**

20 **Objectives:** This study aimed to evaluate the effect of group prenatal care on empowerment of
21 pregnant adolescents. **Methods:** In this randomized controlled trial, 294 pregnant adolescents
22 (aged 15-19) were randomly assigned into two groups of group prenatal care (GPNC, n=147)
23 and individual prenatal care (IPNC, n=147). GPNC group received 5 sessions of GPNC (90-120
24 min) during 16-20 weeks of pregnancy, while the control group received individual prenatal
25 care. The empowerment of participants in the two groups was measured using the empowerment
26 scale for pregnant women. Data were analyzed using the Chi-square test, independent t-test, and
27 adjusted regression test. **Results:** The mean total score of pregnant women's empowerment in the
28 GPNC and IPNC groups after the intervention was 86.46±4.95 and 81.89±4.75, respectively [β =
29 6.11, 95% CI: 4.89, 7.33, p<0.0001]. The improvement of dimensions of pregnancy
30 empowerment in GPNC versus IPNC was as follows: Self-efficacy: 18.21 ± 2.12 vs. 16.19 ±

31 1.79 [β = 2.52, 95% CI: 2.19, 2.86, p <0.0001], Future image: 19.57 \pm 1.57 vs. 18.95 \pm 1.54 [β =
32 0.67, 95% CI: (0.44, 0.9), Self-esteem: 21.79 \pm 1.75 vs. 20.90 \pm 1.85 [β = 0.69, 95% CI: 0.41,
33 0.97, P <0.0001], Joy of an addition to the family: 13.13 \pm 1.69 vs. 12.84 \pm 1.40 [β = 0.51, 95% CI:
34 0.28, 0.74, P =0.009], and Support and assurance from others: 13.70 \pm 1.1 and 13.04 \pm 1.07, [β =
35 0.76, 95% CI: 0.13, 1.65, P <0.0001]. **Conclusion:** Group prenatal care can improve adolescent
36 pregnant women's empowerment. Results of the present study can serve as a useful foundation
37 for implementing the group prenatal care model in Iran.

38 **Keywords:** Adolescent pregnancy; Empowerment; Centering prenatal care; Group prenatal care;
39 Iran

40

41 **Introduction**

42 Adolescent pregnancy is defined as a pregnancy that occurs when the mother is aged between 13
43 and 19.¹ It is one of the main concerns in developing and undeveloped countries.² Every year,
44 about 21 million girls aged 15 to 19 years in undeveloped countries become pregnant, and
45 approximately 12 million of them give birth to their babies.³ Adolescent pregnant women may
46 have adverse pregnancy outcomes.⁴ For example, they are at a greater risk of preterm birth, pre-
47 eclampsia, low birth weight, and maternal and neonatal mortality.⁵ In addition, they often have a
48 low level of education and come from poor socioeconomic status, which can lead to adverse
49 maternal and neonatal outcomes.⁴ In Iran, adolescent pregnancy is expected to increase due to
50 the recent changes in Iran's new population policies aimed at promoting population growth and
51 increasing the young population.⁶ Appropriate prenatal care, however, can improve pregnancy
52 outcomes among adolescent pregnant women.⁷ Such a care aims to optimize the well-being of
53 the adolescent mother and her fetus through education and detection of pregnancy-related
54 adverse outcomes.⁸ Adolescent pregnant women's access to high-quality prenatal care and their
55 increased knowledge during pregnancy both empower them and decrease pregnancy problems.
56 ^{9,10} Empowerment of pregnant adolescent women can improve maternal and neonatal health
57 outcomes.¹¹ Empowerment during pregnancy includes promoting a feeling of satisfaction,
58 satisfaction, increasing independence, improving interaction with others, and increasing
59 psychological energy to achieve successful pregnancy and childbirth.¹²

60

61 In Iran, prenatal care in public health centers is provided individually by a midwife, while in
62 private clinics, it may be provided by a midwife or an obstetrician. Prenatal care is provided in 8
63 individual visits of 10 to 15 minutes. Based on this schedule, the average total length of prenatal
64 visits is nearly two hours during pregnancy. Thus, this limited time of perinatal visits does not
65 allow to meet the educational needs of pregnant women.¹³

66
67 Group prenatal care has been considered as an efficient and effective way to provide prenatal
68 care.¹⁴ One of the known models of group prenatal care is centering pregnancy, which is a
69 woman-centered model of group prenatal care that brings women together into groups.¹⁵ Group
70 prenatal care is unique in that it is a group, not a class. Instead of hierarchical transmission of
71 information, group prenatal care is based on facilitation of sharing experience and knowledge by
72 healthcare providers.¹⁵

73
74 In this model of care, 8-12 women with similar gestational age meet in prenatal care sessions
75 which last approximately 60-90 minutes. The pregnant women measure their height and weight
76 and share their experiences in the group session. Compared with individual prenatal care, group
77 prenatal care places emphasis on education and social support. In this model of care, pregnant
78 women are engaged in their health care and share their learning, skills, and experiences.¹⁵

79
80 Evidence suggests that group prenatal care improves pregnancy outcomes such as birth weight,
81 low birth weight (LBW), preterm birth, increased breastfeeding initiation, and increased family
82 planning uptake.¹⁶⁻¹⁸

83
84 Group prenatal care provides more time for pregnant women to improve their knowledge and
85 active participation in self-care. Active participation of mothers in self-care through GPNC can
86 increased their ability to improve their decision-making, self-efficacy, and empowerment.^{15,19}

87
88 Given the importance of adolescent pregnancy empowerment in maternal and neonatal health
89 outcomes, and considering paucity of research on this issue in Iran, we conducted the current
90 study to evaluate the effect of group prenatal care on adolescent pregnancy empowerment.

91

92 **Methods**

93 This study was a parallel randomized controlled trial conducted between August 2021 and July
94 2022. The main objective of the study was to evaluate the effect of GPNC on the empowerment
95 of adolescent women. The specific objectives of the study were to assess the effect of group
96 GPNC on the dimensions of pregnancy empowerment, including self-efficacy, joy of an addition
97 to the family, self-esteem, future image, and support and assurance from others. This study is
98 part of a mixed-method study conducted to evaluate the effect of group prenatal care (GPNC) on
99 adolescent pregnancy outcomes in Ahvaz, Iran. The design of the study was approved by the
100 Ethics Committee of Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran (Ref. ID:
101 IR.AJUMS.REC.1400.235), and it was also registered in the Iranian Registry for Clinical Trials
102 (Ref No: IRCT20210703051764N1). Each participant signed informed written consent before
103 data collection.

104

105 Participants in this study included married adolescent pregnant women aged 15–19 who referred
106 to public health centers in Ahvaz, Southwest of Iran to receive prenatal care. Women were
107 eligible to participate in this study if they: were aged 15-19 years, had a gestational age of 16–22
108 weeks with singleton pregnancy, were gravida 1 or 2, and had low-risk and intended pregnancy.
109 Exclusion criteria included any medical complications that classified women in high-risk
110 pregnancies such as diabetes and high blood pressure.

111

112 **Sample size**

113 Based on the objectives of the study, and according to a previous study²⁰ assuming the power of
114 80 %, $\alpha= 0.05$, the sample size was calculated to be 132 women for each group using the
115 following formula. Given the possible 10% attrition rate, 147 women were considered for each
116 of the intervention and control groups.

$$\frac{\left(Z_{(1-\alpha/2)} + Z_{(1-\beta)} \right)^2 [p_1(1 - p_1) + p_2(1 - p_2)]}{(d)^2}$$

117

118 **Sampling**

119 The lead researcher (FM) attended the 37 public health centers existing in Ahvaz and screened
120 the health records of eligible adolescent pregnant women who met the inclusion criteria. Eligible

121 adolescents were then called by phone and were briefed on the general objectives of the study.
122 Then individuals who were willing to participate in the study were invited to the health center. In
123 a face-to-face meeting, the participants were given detailed explanations about the study
124 objectives, duration, and method, along with confidentiality of information and their right to
125 withdraw from the study at any stage of the study.

126

127 **Randomization**

128 In this study, after recruiting the eligible women, randomization was performed based on block
129 randomization method (using a random sequence computer program) with a block size of four
130 and six and an allocation ratio of 1:1. To conceal random allocation, the type of intervention was
131 written on a paper and placed inside opaque envelopes, and all envelopes were kept by a person
132 who was not involved in sampling or data collection. Because of the nature of the intervention,
133 it was not possible to blind the researchers or the participants. However, both the researcher and
134 the participants did not know about the order of participation until the commencement of the
135 study. After informed consent was obtained, the participants were randomized to receive either
136 individual prenatal care (IPNC) (control group) or GPNC (intervention group) (Figure 1).

137

138 **Setting**

139 Six public primary health centers (PHCs) that had the largest number of adolescent pregnant
140 women among the 37 centers in Ahvaz were selected for sampling. Ahvaz, the capital of
141 Khuzestan province, is one of the most populous cities in Iran and is located in the southwest of
142 Iran.

143

144 **Intervention**

145 The first prenatal care visit was performed individually at 6–10 weeks of pregnancy. In this
146 session, the demographic questionnaire was completed through face-to-face interview. The
147 adolescents in the intervention group were classified into 25 groups. Each group consists of 5 to
148 6 adolescents at approximately the same gestational age who participated in 5 sessions of 90-120
149 min during their pregnancy.

150

151 At the beginning of each group session, the lead researcher (FM) individually measured fundal
152 height and auscultated the fetal heart in the space of group. In the first session, adolescent
153 women were taught how to measure their blood pressure and weight. At each session, blood
154 pressure and weight were measured under the supervision of a midwife. After these
155 measurements, the discussion for the session began. The group sessions were conducted in a
156 circle. The content of the discussion was based on a prenatal care booklet issued by the Iranian
157 Ministry of Health (Table 1). Groups were organized by the lead researcher. A topic that was
158 relevant to the gestational age of the group members was introduced, and the women were asked
159 to present their experiences about it. The adolescent pregnant women were encouraged to
160 participate in prenatal care educational sessions and express their ideas, knowledge, and
161 experiences with respect to care; then the necessary training was provided by the midwife in
162 simple language. The participants were also allowed to raise their questions and concerns about
163 pregnancy and childbirth. Other aspects of prenatal care, such as blood and urine tests and
164 ultrasounds, were performed individually by a laboratory technician and a radiographer, and the
165 participants were not involved in these measurements. There was a “private time” at the end of
166 each session dedicated for the participants to ask private questions and for evaluation of urine
167 and blood tests or ultrasounds. The ample time spent with a midwife and peers in GPNC allowed
168 the mothers to talk freely with each other and be more comfortable asking their questions. As a
169 result, they gained a vast amount of useful information. The control group received routine
170 individual prenatal care, provided by a midwife who was employed in the health center.

171

172 **Measures**

173 The data collection instruments were a demographic and obstetric questionnaire and the
174 empowerment scale for pregnant women. The demographic and obstetric questionnaire consisted
175 of questions about age, gestational age, gravidity, education, occupation, education and
176 occupation of the husband, and economic status.

177

178 The content validity of the demographic and obstetric questionnaire was confirmed. Participants
179 in the intervention and control groups were asked to complete the demographic and obstetric
180 questionnaire at the outset of the study. The empowerment scale for pregnant women was
181 completed in two phases, namely before intervention (6-10 weeks) and after intervention (38-40

182 weeks), by both the intervention and the control groups. The empowerment scale for pregnant
183 women was developed by Kameda et al. (2008).¹² This questionnaire includes 27 questions in
184 five dimensions, namely self--efficacy (including 6 items related to the feeling of being able to
185 manage pregnancy and childbirth), future image (including 6 items related to the images and
186 aims regarding pregnancy, childbirth, hope for the future, and becoming a parent), self-esteem
187 (including 7 items related to acceptance of being pregnant and a mother), support and assurance
188 from others (including 4 items concerning acceptance and support) and a joy of an addition to the
189 family (including 4 items about enjoyment for the addition of a new family member). This
190 questionnaire was scored using a four-point Likert scale, ranging from 1 (strongly disagree) to 4
191 (strongly agree). The total scores of the questionnaire ranged from 27 to 108. A higher score
192 indicates higher pregnancy empowerment. The validity and reliability of this questionnaire have
193 been evaluated by Hajipour et al. in Iran in 2012.²¹ In this study the internal consistency of the
194 questionnaire using Cronbach's alpha was 0.72 with a sample size of forty participants. The
195 stability of the questionnaire using the test-retest method on forty participants with a two-week
196 interval was 80 percent. A midwife assisted the lead researcher with data collection.

197

198 **Statistical analysis**

199 All data were analyzed using SPSS version 22. The Shapiro-Wilk test was used for checking the
200 normal distribution of data. The independent t test was used to compare the age, BMI, and mean
201 total score of pregnant women's empowerment in the two groups. Chi-square test was used for
202 comparing categorical data such as gravidity, education, economic status, occupation, family
203 support, and extended family. Logistic regression was used to detect differences between the two
204 groups in terms of pregnancy empowerment after adjusting for confounding variables. $P < 0.05$
205 was considered statistically significant.

206

207 Ethical approval for this study was granted by the Ethics Committee of Ahvaz Jundishapur
208 University of Medical Sciences (Ref. ID: IR.AJUMS.REC.1400.235).

209

210 **Results**

211 At the end of the study, five participants dropped out (the reasons are listed in Fig. 1), and 289
212 participants completed the study. The socio-demographic characteristics of the participants in the

213 two groups of GPNC and IPNC are shown in Table 1. The mean age of participants was 17.42
214 and 17.40 in the GPNC and IPNC groups, respectively ($p= 0.085$). Most of the participants had
215 an elementary education and were categorized at a moderate level regarding their economic
216 status. The two groups did not have any significant differences in terms of age, parity, education,
217 economic status, family support, and occupation. (Table 2). The mean total score of the pregnant
218 women's empowerment of the two groups of GPNC and IPNC before intervention was 78.29
219 ± 3.81 and 78.07 ± 1.20 respectively ($p=0.579$). In addition, the two groups had no significant
220 differences regarding all dimensions of empowerment before intervention. (Table 3).

221
222 The mean total score of pregnant women's empowerment in the GPNC and IPNC groups after
223 the intervention was 86.46 ± 4.95 and 81.89 ± 4.75 , respectively. Based on the results of
224 independent t- test, a statistically significant difference between the two groups was observed
225 after intervention ($p < 0.0001$). After the intervention, the total score of empowerment and all its
226 subscales were higher in the intervention group compared to the control group. Based on the
227 result of adjusted linear regression analysis, there were significant post-intervention differences
228 between the two groups regarding the total score of empowerment and all its subscales except for
229 the subscale of "support and assurance from others". The differences between the GPNC and
230 IPNC groups were as follows:

231
232 Self-efficacy: 14.65 ± 1.95 vs. 14.72 ± 1.58 ; [$\beta = 2.52$, 95% CI : 2.19, 2.86], Future image:
233 19.57 ± 1.57 vs. 18.95 ± 1.54 [$\beta = 0.67$, 95% CI: 0.44, 0.9), The joy of an addition a member to the
234 family: 13.13 ± 1.69 vs. 12.84 ± 1.40 [$\beta = 0.51$, 95% CI: 0.28, 0.74], Support and assurance from
235 others: 12.16 ± 1.30 and vs. 12.28 ± 1.21 [$\beta = 0.76$ 95% CI: -0.13, 1.65, $P=0.094$) (Table 3).

236 237 **Discussion**

238 This study aimed to evaluate the effect of GPNC on adolescent pregnancy empowerment.
239 According to the results, the mean score of the "self-efficacy" dimension improved significantly
240 in the GPNC group compared to the control group after intervention. Active participation of
241 adolescent mothers in self-care increased their ability to improve their decision-making power
242 and self-efficacy which could contribute to empowerment. This finding was similar to the results
243 of Heberlin et al's study.²² Furthermore, the Mckinnon et al. study found that GPNC improved

244 maternal self-efficacy.¹⁶In contrast to our findings, however, Somji et al. did not find statistically
245 significant differences in self-efficacy between the two groups.²³ The difference between their
246 study and the current study could be due to the instrument used to measure pregnant women's
247 self-efficacy.

248
249 Our results also showed that the subscale of self-esteem was improved significantly in the GNPC
250 group compared to the control group. Low levels of self-esteem can reduce access to healthcare
251 services and acceptance of effective interventions.²⁴ By contrast, a high level of self-esteem is
252 effective in helping the mother cope with the challenges of pregnancy and childbirth.²⁵ As a
253 result, it can affect the pregnant woman's experience and pregnancy outcomes.²⁶ Social support
254 increases the mother's competence and empowerment by improving her self-esteem and
255 reducing stress during the period of transition to motherhood.²⁷ This study revealed that GPNC
256 affected the self-esteem dimension by providing information, peers, and midwife support. This
257 finding was aligned with Herman et al. who found that the information, support, and peer
258 relationships available in group care helped pregnant women to develop their skills and ability to
259 deal with stressful factors and increased promoted their self-esteem and empowerment.²⁸

260
261 The result of the present study showed that the mean score of the "Future images" dimension
262 was significantly increased in the GPNC group compared to IPNC group. The future image
263 refers to a realistic picture of the long and short-term aims of pregnancy, childbirth, and
264 motherhood.¹² Acquiring information and social support helped adolescent pregnant women to
265 improve their mood and self-image, reduce their worries related to pregnancy, and facilitated the
266 acceptance of childbirth.²⁹

267
268 Our results showed that the mean score of the "Joy of an addition to the family" dimension in the
269 GPNC group significantly increased compared to the IPNC group after intervention. Adolescent
270 pregnant women have dual feelings about pregnancy. For some pregnant adolescents, having a
271 child gives them a meaningful life, and it can help them in their transition to adulthood.
272 However, some of them consider pregnancy and motherhood as a negative event.^{30,31}

273

274 The education and support provided for pregnant women through GPNC prepared them for the
275 transition to motherhood.²² Therefore, it seems that GPNC in the present study could instill the
276 feeling of joy of an addition to the family in adolescent pregnant women by preparing them for
277 motherhood.

278

279 Pregnant women are very concerned about their health and their baby's well-being.³² These
280 concerns are often due to inadequate information about the physical and emotional changes
281 associated with pregnancy.³⁰ Knowledge acquisition during pregnancy enables women to adapt
282 to the physical and emotional changes associated with pregnancy.³²

283

284 Holding group care sessions and providing ample opportunities for the mothers to talk about
285 their pregnancy concerns have been found to enhance their knowledge and reduced their
286 worries.^{22,33} Furthermore, interaction with peers in GPNC and the exchange of information and
287 pregnancy experiences provide peer support. Therefore, GPNC can lead to informational and
288 emotional support.³⁴ Of course, preserving the privacy of participants may be a concern during
289 GPNC. In the current study, none of participants had any concern about lack of privacy.

290 Although, a number of studies such as Sultana et al. have shown that GPNC facilitates
291 informational and emotional support from peers and health care providers,³⁵ others including
292 Kennedy et al. did not find any significant differences in social support measures, and their
293 participants wanted to have private time with the health care provider.³⁶ In this study, although
294 adjusted linear regression analysis did not show any significant difference between the two
295 groups in terms of the subscale of support and assurance from others, there was a significant
296 difference between the two groups based on dependent t-test analysis. In the present study, it
297 seems that GPNC can promote the feeling of receiving support and approval from others.

298

299 According to the findings of this study, after intervention, the total empowerment score was
300 significantly improved in the GPNC group compared to the IPNC group. In other words,
301 compared with IPNC, GPNC has a greater effect on adolescent pregnancy empowerment. This
302 result was supported by El Sayed et.al who showed a positive effect of GPNC on pregnant
303 empowerment.³⁷ Additionally, the study by McKinnon et al. found that GPNC improved
304 empowerment in pregnant women.¹⁶ Trudnak suggested that women in GPNC received more

305 education and support and were more empowered to make decisions about their pregnancy and
306 childbirth.³⁸ On the contrary, Somji et al. found no differences between GPNC and IPNC groups
307 in terms of empowerment.²³The difference between their study and the current study could be
308 attributed to the instrument used to measure pregnant women's empowerment.

309

310 **Strengths and limitations of the study**

311 This is the first study to evaluate the effect of group prenatal care on adolescent pregnancy
312 empowerment in Iran. Despite its strengths, this study has some limitations. First, the
313 participants could not be blinded to the study condition. However, we used randomization to
314 minimize bias, and the women did not know their grouping before the commencement of the
315 study. Second, most of the participants in this study were from low-income families in Ahvaz
316 city, and this may affect the generalizability of the results. Third, the involvement of the
317 researcher in conducting the group discussion may be a source of bias.

318

319 **Conclusion**

320 Group prenatal care can improve adolescent pregnant women's empowerment. Results of the
321 present study can serve as a useful foundation for implementing the group prenatal care model in
322 Iran.

323

324 **Author's Contribution**

325 FM, PA, MI and EIM were involved in the design of the study. FM collected the data. FM, NS,
326 PA, EIM, and EeM contributed to data analysis and interpretation. PA and FM prepared the
327 manuscript. All authors read and approved the final manuscript.

328

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331 study on the effect of group prenatal care on pregnancy outcomes, a mixed method study. The
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334

335 **Conflicts of Interest**

336 The authors declare no conflicts of interest.

337

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341

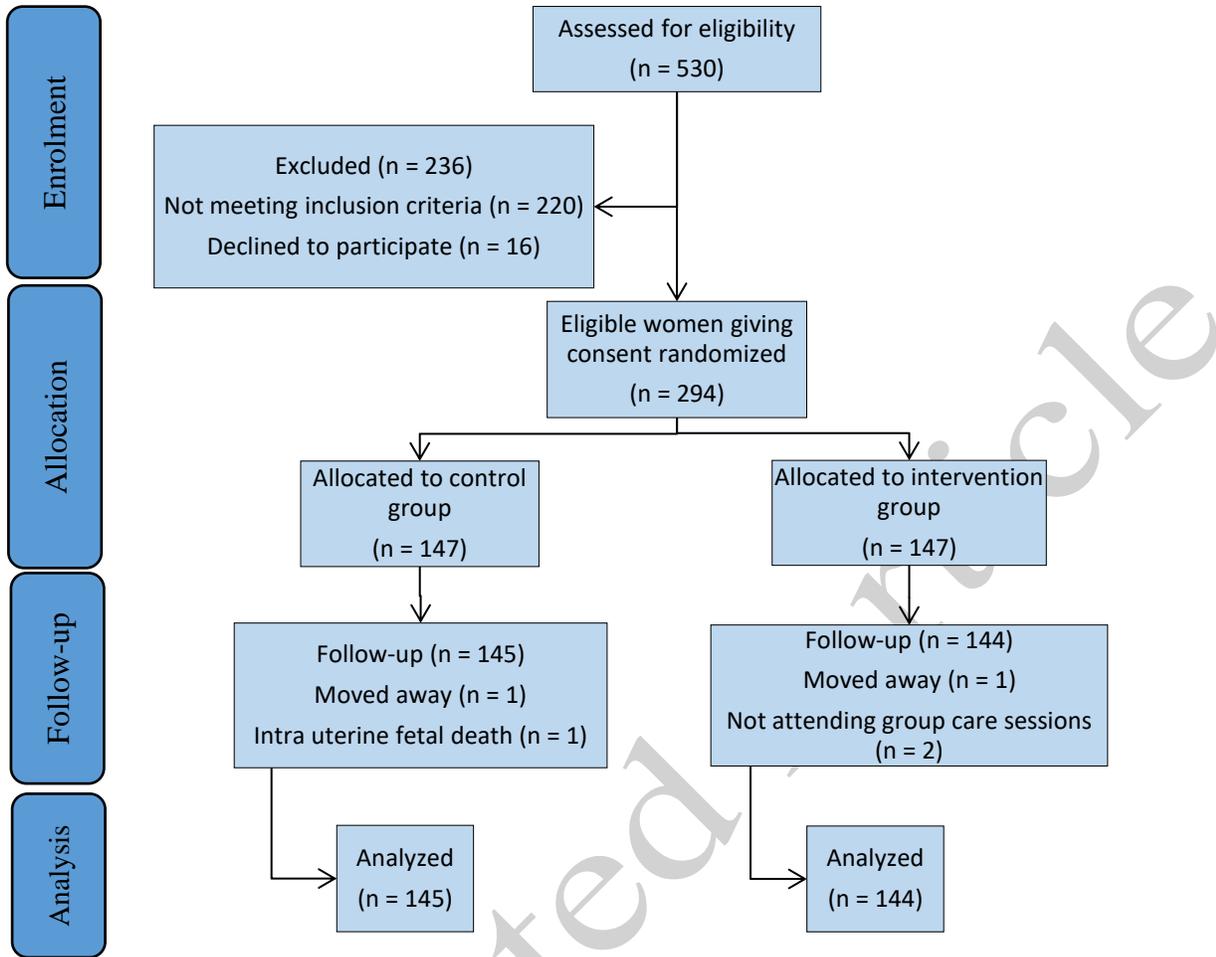
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452

453 **Figure 1:** Flow diagram of recruitment and retention of participants in the study.

454

455 **Table 1:** Topics discussed in group prenatal care sessions.

Sessions	Content
First 16 to 20 wk	Danger signs in pregnancy, dental hygiene, discomforts and common complaints of pregnancy, nutrition, and supplement.
Second 24 to 30 wk	Mental health, sexuality
Third 31 to 34 wk	Childbirth and the benefits of natural childbirth, how to check fetal movement.
Fourth 35 to 37 wk	Preparation for childbirth, breastfeeding, neonatal care
Fifth 38 wk	labor symptoms, the right time for the next pregnancy

456

Accepted Article

457 **Table 2:** Socio-demographic characteristics of the participants in GPNC and IPNC groups

Variables	GPNC n=147	IPNC n=147	P value
	Mean ± SD * or N (%)		
Age (y)	17.42±1.31	17.40±1.28	0.858
Gravidity			0.064
1	138(93.9)	135(91.8)	
2	9(6.1)	12(8.2)	
BMI at base line(kg/m2)	22.48±2.51	22.50±2.31	0.857
Education			0.769
Primary	24(16.6)	21(14.3)	
High school	100(68)	102(69.4)	
High school diploma	24(16.3)	23(15.6)	
Economic status			0.656
Good	37(25.1)	42(28.6)	
Moderate	72(49)	70(47.6)	
Poor	38(25.9)	35(23.8)	
Occupation			0.498
Housewife	145(98.6)	147(100)	
Employee	2(1.4)	0(0)	
Family support			0.526
Very good	124(84.4)	121(82.3)	
Good	22(15)	25(17)	
Fair	0(0)	1(7)	
Inappropriate	1(0.7)	0(0)	
Extended family			0.48
Yes	118(80.3)	112(76.2)	
No	29(19.7)	35(23.8)	

458 * Standard deviation

459

460 **Table 3:** The scores of total empowerment and its dimensions in the GPNC and IPNC groups.

Variables	Groups		P- value	β *	CI ** 95%
	GPNC n=147	IPNC n=147			
	Mean \pm SD				
Self-efficacy					
Before	14.65 \pm 1.95	14.72 \pm 1.58	0.997		
After	18.21 \pm 2.12	16.19 \pm 1.79	<0.0001	2.52	(2.19, 2.86)
Future image					
Before	18.12 \pm 1.68	18.09 \pm 1.66	0.824		
After	19.57 \pm 1.57	18.95 \pm 1.54	<0.0001	0.67	(0.44, 0.9)
Self-esteem					
Before	20.94 \pm 1.66	20.63 \pm 1.75	0.069		
After	21.79 \pm 1.75	20.90 \pm 1.85	<0.0001	0.69	(0.41, 0.97)
Joy of an addition to the family					
Before	12.36 \pm 1.28	12.34 \pm 1.22	0.986		
After	13.13 \pm 1.69	12.84 \pm 1.40	0.009	0.51	(0.28, 0.74)
Support and assurance from others					
Before	12.16 \pm 1.30	12.28 \pm 1.21	0.394		
After	13.70 \pm 1.1	13.04 \pm 1.07	<0.0001	0.76	(0.13, 1.65)
Total score of empowerment					
Before	78.29 \pm 3.81	78.07 \pm 1.20	0.579		
After	86.46 \pm 4.95	81.89 \pm 4.75	<0.0001	6.11	(4.89, 7.33)

461 *Estimating the regression coefficient; **Confidence interval