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ORIGINAL ARTICLE

The Supportive Role of Companion Midwife on Maternal and Newborn Outcomes in Primiparous Women: A Retrospective Cost Analysis in Yazd

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A B S T R A C T

Background: The World Health Organization recommends that women be continuously supported by a favorite companion during labor. Currently, there is no strong evidence on specific support measures by midwifery in relation to improving the delivery process.

Methods: The present retrospective cost analysis study was conducted during 2021-2022. The reports of 243 deliveries were checked in the patients' files in selected hospitals of Yazd city. Data analysis was done using $SPSS_{26}$.

Results: According to the study objectives, the desired delivery outcomes included type of delivery, postpartum complications, postpartum bleeding, and length of the active phase of labor, resuscitation of the newborn, hospitalization of the newborn, and Apgar score of the newborn in the first and fifth minutes. There was a statistically significant difference in delivery, postpartum complications, length of the active phase of labor and hospitalization of the newborn in the neonatal unit, resuscitation of the newborn, and the amount of nutrition of the exposed group compared to the non-exposed group. Among the desired performance indicators, patient length of stay and total cost per person between the exposure and non-exposure groups, the mean score of the cost per person had a statistically significant difference between the two groups ($P<0.001$).

Conclusion: Generally, the presence of a companion midwife next to the mother in the delivery room improves some of the outcomes of the mother and the baby. It is recommended to carry out studies in this field along with checking mothers' satisfaction with companion midwives.

Keywords: Primiparous Women, Supportive Role, Doula, Delivery Outcomes

Introduction

Labor or childbirth is a phenomenon that has existed as long as human history. It is one of the most important events in a woman's life which can bring different experiences for the mother. These experiences affect the mother and her family (1, 2). Labor is a critical and physiological stage in human development and may be accompanied by severe pain and feeling of uncertainty (3). The pain of labor is one of the most intense pains that a woman experiences in her life. Research indicates that about 60% of primiparous women suffer from severe and unbearable pain during labor (4). Based on scientific literature, fear, anxiety, and pain are three factors that play an important role during labor. If fear and anxiety are removed, mental and physical tranquility will be achieved (2). In a study conducted on

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Swedish women, 36% of them mentioned the fear of pain as the main reason for choosing cesarean section (2, 5). The fear of labor causes worry and anxiety of the mother; as a result, it will impose negative effects on the outcomes of the mother and the neonate (6). There are many strategies to reduce the mother's fear and anxiety and as a result, to improve the labor process; support is the most effective of these methods. The history of mother support shows that in developed countries, the birthing woman is supported by her husband or one of her close relatives during labor. Yet, this possibility has not existed in many countries (7) and with the change of the place of labor from home to the hospital and the use of numerous medical interventions; many clients have been deprived of companion midwife and receiving support from the family and other women during labor. Nevertheless, the need to accompany the mother during labor has been recently noticed and accepted (8). The results of many research studies confirm that continuous care during labor abolishes the maternal and neonatal labor consequences (6). Therefore, the World Health Organization declares that mothers should be supported during labor and delivery, and this support should be provided by people with whom she feels comfortable (9). Moreover, this organization has stated that supporting women during labor is very important, especially for primiparous pregnant women, because intrapartum care for a positive birth experience, in addition to the benefits of attenuating anxiety and stress, will lead to better results such as a reduction in cesarean section (10). This is despite the fact that in developed countries, the birthing woman is supported by her husband or other family members in 95% of cases (8). Hence, the skill in continuous support and backing of the mother, which includes emotional support (constant presence, reassurance, and encouragement), physical support (reducing thirst, hunger, and pain), giving information about the birth process and how to manage it, respecting the mother in the decision-making process, and helping her to communicate with other caregivers, gain trust, and establish intimate relationships during labor is an important part of a good and correct midwifery care (11). Consequently, the necessity of continuous presence of a trained companion midwife (Doula) in birthing woman's bedside can lead to continuous support and care during labor (12). On the other hand, one of the programs of the Ministry of Health, Treatment and Medical Education in recent years has been promoting normal vaginal delivery and creating mother-friendly hospitals and reducing unsanitary births. Indeed, research results have shown a relatively high rate of maternal mortality and unsanitary births by untrained people in Sistan and Baloochestan province (13). Many studies carried out in the field of investigating the effect of the companion midwife's support on the maternal and neonatal outcomes of labor have shown that the presence of a companion midwife by the mother's side improves some birth outcomes. Besides, women who are accompanied by a midwife during pregnancy have more flexibility and a tendency to have a normal vaginal delivery (14). So, following the change of labor outcomes by the support of the companion midwife, the performance indices of the obstetrics ward will also change. Based on a study conducted in Ahvaz on the performance indices of the gynecology and obstetrics ward, it was shown that a number of performance indices of the obstetrics ward were not in a favorable condition. Thus, the need to design and implement the necessary measures to improve these indices was very important (15). Furthermore, according to the results of studies conducted in recent years, the presence of a companion midwife next to birthing women is a non-invasive and effective intervention in creating physical and mental relaxation during labor and delivery (16). By comparing the neonatal outcomes of primiparous women in two groups of physiological and conventional labor, it can be seen that the neonatal outcomes have been improved by using physiological labor and pharmaceutical methods of pain reduction (2). Also, based on a study (2017) conducted in Neishabour Hospital, the effect of the presence of the companion midwife between the two groups was not significantly different upon entering the labor ward in terms of socio-demographic characteristics, the mean score

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of midwife anxiety, and fear of normal vaginal delivery. However, the presence of a midwife significantly reduced the mean score of anxiety and fear of childbirth (FOC) in the active phase of labor and one hour after the placenta was removed in mothers of the intervention group compared to the control group (17). Considering the very effective role of the companion midwife in the labor process, the project of employing companion midwives in the circular of the Ministry of Health and Medical Education was launched in Iran in 2009. The project of employing a companion midwife is part of the national program to promote normal vaginal delivery and reduces the rate of cesarean section in Iran, with the aim of increasing the willingness of mothers to perform normal vaginal delivery throughout the country and improving the key indices of gynecology and labor in the country. On the other hand, to check the efficiency and effectiveness of the companion midwife project on the patient and the hospital, it is necessary to have performance indices. The implementation of the companion midwife deployment project was started in Iran in 2013 and 2017 during the health transformation plan. Besides, the realization of the indices listed in the sixth Iranian development plan with the subject of the percentage of normal delivery index of 33.23% was also achieved. Considering the importance of safe and comfortable labor for mothers and the lack of sufficient scientific evidence in the world regarding the effect of the use of a midwife on the performance indices of primiparous women, the present study aimed to investigate the effect of the support of a midwife on maternal and neonatal labor outcomes in primiparous women and performance indices in the selected hospitals of Yazd, Iran.

Materials and Methods

In the present retrospective cost analysis study, the research population included pregnant women referred to Shahid Sadoughi Hospital and Afshar Hospital affiliated to Yazd Shahid Sadoughi University of Medical Sciences in 2021. The research sample consisted of 243 primiparous women who had referred to the hospitals for labor. The inclusion criteria were primiparous pregnant women and also primiparous pregnant women with low-risk pregnancies with an age range of 18-35 years, gestational age between 37-42 weeks, women in cervical dilatation of 4-6 cm or more, i.e., active phase of the first stage of labor, head presentation, beginning of spontaneous uterine contractions, and presence of companion midwife from the beginning of the active phase of labor to 2 hours after labor. The exclusion criteria were unwillingness to participate, termination of maternal support, hospitalization of the infant, malformation, specific diseases, or death of the infant. Eligible people were divided into 2 support and non-support groups, and due to the small number of primiparous mothers in the support group, sampling was done by census. The non-support group was selected randomly. The data were collected by the researcher by completing the checklist and reviewing the patients' medical records. The checklist included a 29-question period of data on demographic characteristics and assessment of maternal and neonatal labor outcomes such as type of labor, induction, bleeding rate, neonatal Apgar score, amniotic meconium fluid, length of the active phase of labor, dilatation rate, and fetal weigh and the length of the person's stay in the hospital and the hospital cost. The basis for calculating costs in both groups was the hospital information system (HIS). The validity of the checklist was established through content validity, so that the content of the checklist was studied and evaluated by 7 faculty physicians. After collecting expert opinions, the necessary corrections were made. Regarding the reliability of the checklist, the simultaneous observation test was used. The checklists of 10 samples were completed simultaneously by the researcher and one of their colleagues who was at the same level as the researcher. To determine their correlation, McNamara’s test was used for qualitative items and Spearman's correlation coefficient test was used for ranking items. No significant difference was observed between the results of the two

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groups. The correlation coefficient for ranked items was 95%. After completing the informed consent form, explaining the purpose of the study, and emphasizing the anonymity and confidentiality of research information, labor outcomes in both groups were observed from the time of admission up to after labor. The data were analyzed with $SPSS_{26}$ using t-test, Chi-square, and logistic regression (P<0.05).

Ethical considerations

This study was conducted after obtaining the code of ethics: IR.SSU.SPH.REC.1401.035 from School of Public Health at Shahid Sadoughi University of Medical Sciences in Yazd and obtaining informed consent from all relevant stakeholders and providing feedback on the results.

Results

Out of a total of 270 primiparous mothers hospitalized in the studied hospitals, 19 mothers did not meet the inclusion criteria. Based on this, 90 people (35.8%) were assigned into the support group (with companion midwife) and 161 people (64.2%) were allocated to the non-support group (without the support of an companion midwife) (Figure 1).

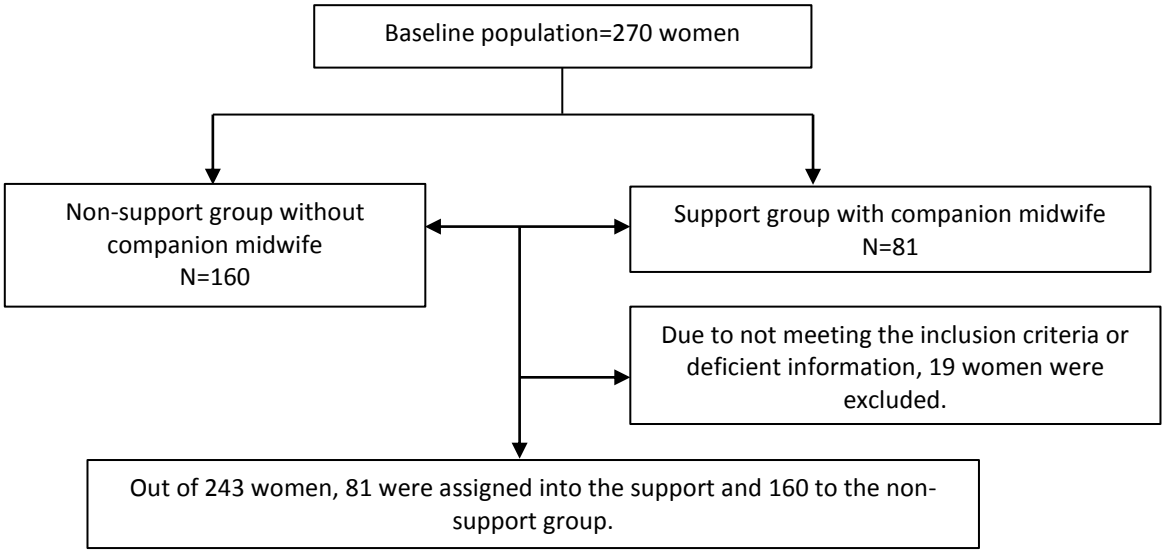

Figure 1. Distribution of research samples according to support exposure

The mean age (SD) of the studied women was 23.10±4.84 years and there was a significant difference between the two groups, so that the mean age of women with a midwife was higher than the others (P=0.044). Regarding the occupation of women, the majority of them (61.1%) were housewives and a significant difference was observed between "occupation" and "having an companion midwife". Employed women chose significantly more frequently companion midwives than housewives and self-employed women (P<0.05). Besides, the results revealed a significant decrease in cesarean section in women with companion midwives. In terms of education, the use of companion midwives increased in women with the increase in the level of education. Iranian subjects also used companion midwives significantly more than non-Iranian subjects (P<0.05).

The results suggested that the odds of normal postpartum bleeding in women with a midwife was 78% lower than that of the control group (P=0.049, HR=0.22). In women with companion midwife, the rate of activation of the labor phase was twice that of others (P=0.019, HR=2.01). The mean weight gain in women with companion midwife was 1% higher than others (P=0.042, HR=1.01).

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Table 1. Comparison of the demographic characteristics of the samples in two groups with and without the support of companion midwives

Variable		Total population N=251	Support group N=161	Non-support group N=90	P-value
Mother's mean age (year)		23.10±4.84	22.64±4.85	23.92±4.74	0.044
Mother's occupation	Housewife	(74.5)187	(82)132	(61.1)55	P<0.05
	Employee	(15.5)39	(8.7)14	(27.8)25	
	Self-employed	(10)25	(9.3)15	(11.1)10	
Type of labor	CS	(71.7)180	(60.2)97	(92.2)83	P<0.05
	Normal delivery	(28.3)71	(39.8)64	(7.8)7	
Education level	Illiterate	(8)20	(11.8)19	(1.1)1	P<0.05
	Primary school	(15.5)39	(21.7)35	(4.4)4	
	Junior high school	(16.3)41	(17.4)28	(14.4)13	
	High school	(35.9)90	(35.4)57	(36.7)33	
	BS/BA	(18.3)46	(9.9)16	(33.3)30	
	MSc/MA and higher	(6)15	(3.7)6	(10)9	
Nationality	Iranian	(23.9)60	(32.9)53	(7.8)7	P<0.05
	Non-Iranian	(76.1)191	(67.1)108	(92.2)83	

Table 2. Comparison of maternal and neonatal labor outcomes according to having a companion midwife

Variable	Type	Support group	Non-support group	B-value	Chance proportion	P-value
Postpartum bleeding	Normal	(97.6)82	(91.8)135	-1.509	0.221	0.049
	Abnormal	(2.4)2	(8.2)12	-	-	-
Neonatal resuscitation	Resuscitated	(93.5)2	(91.2)134	-1.509	0.221	0.049
	Non-resuscitated	(2.4)2	(8.2)12	-	-	-
Neonatal NICU hospitalization	Hospitalized	(100)84	(95.2)140	-18.25	0.000	0.999
	Non-hospitalized	(0)0	(7.8)7	-	-	-
Fifth minute Apgar score	8-10	(100)84	(98.6)145	20.63	2.47	0.168
	<7	(0)0	(2.4)2	-	-	-
Polyhydramnios	Yes	(100)84	(99.3)146	-16.12	0.000	0.99
	No	(0)0	(0.7)1	-	-	-
Amniotomy	Clear	(89.3)75	(79.6)11	0.61	0.85	0.102
	Meconium	(10.7)9	(20.4)30	-	-	-
Labor phase	Active	(33.3)28	(20.4)30	0.701	2.01	0.019
	Non-active	(66.7)56	(79.6)117	-	-	-
Induction	Prescribed	(45.2)38	(45.6)67	-0.034	0.967	0.89
	Not prescribed	(54.8)46	(54.4)80	-	-	-
COC-CAT	No	(98.8)83	(90.5)133	-0.251	0.77	0.043
	Yes	(1.2)2	(9.5)14	-	-	-
HOD-CAT	No	(72.6)61	(79.01)103	-0.053	0.94	0.161
	Yes	(27.4)23	(29.9)44	-	-	-
Neonatal weight	-	3008.95±474.04	3134.22±438.09	0.001	1.01	0.042
Dilatation	-	2.97±1.84	3.10±1.50	0.044	1.045	0.564

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All costs were higher in the non-support group than in the Support group. Among the desired performance indicators in the study, there was a significant difference in the mean score of the cost per person between the exposed and non-exposed groups, so that the companion midwife was able to reduce the costs of the mother's hospitalization ($p<0.05$). However, no statistically significant difference was found between the two groups in the indicator of the length of stay of the mother in the hospital.

Table 3. Comparison of cost and LOS in two groups with and without the support of companion midwives

Variable	Support group		Non-support group		Test statistics	P-value
	Mean	SD	Mean	SD		
Cost per person	18468088	5234074	28295569	38637605	4339.5	<0.001
Cost based on the global tariff	8726330	7536214	10380228	7872911	5255.5	0.049
Excess of the global tariff	387192	850422	1091475	2361463	4875.5	0.001
Out of pocket payment	1380007	4328624	8898997	17091495	3432.5	<0.001
Length of stay	0.872	2.29	2.56	1.12	5420	0.082

*All costs are based on the Rial unit and the tariff of 2018

Discussion

The present study results showed that the continuous support of the mother by the companion midwife could affect some of the labor outcomes such as the length of the active phase of labor, the type of labor, and postpartum complications However, other labor outcomes did not change in the presence of a companion midwife. Several studies have demonstrated the positive effects of continuous support of the mother during the labor process. Dadshahi in their study reported that maternal outcomes such as type of labor, duration of the active phase of the first stage of labor, and oxytocin administration in the case group were not significantly different from the control group. Among the neonatal outcomes, the rate of breastfeeding in the first hour after birth has been reported in the case group (1). However, in the present study, there was a statistically significant difference in the administration of oxytocin between the support and non-support groups. Khavandizadeh reported a decrease in the duration of labor and a decrease in cesarean section in mothers who had a companion midwife (12). Lundgreen's study indicated that continuous support during labor by a companion midwife reduced the duration of labor, the amount of oxytocin administration, and the rate of cesarean section and increased the rate of normal vaginal delivery (11). Furthermore, in the study by Mehri Rezaei, it was demonstrated that the presence of a midwife increased the susceptibility to the amount of bleeding (bleeding up to 1000 mL is considered within normal limits). As a result, the companion midwife has been able to keep a higher percentage of people within the range of normal bleeding. However, according to the present study, there was no significant correlation between postpartum bleeding and companion midwife.(3,18) Studies by Brugman et al.,(9) Melzak et al,(19) Hadnett et al.,(20) and Gagnon et al.(21)have also shown that the support of a midwife exerts no effect on outcomes such as reducing the duration of the active phase of labor, the intensity of pain, and postpartum complications (9, 19-22), which is not consistent with the present study. However, Darvish et al. reported that the presence of a midwife with birthing women is effective as a non-invasive and relaxing intervention from a physical and psychological perspective during labor and childbirth, which is consistent with the present study (16).

Strengths and limitations of the study

One of the strengths of this study was the retrospective design, which, in addition to

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examining the impact of the companion midwife on the maternal and neonatal labor outcomes, the effectiveness of the hospital's performance indices in relation to the companion midwife was investigated for the first time in Iran. Thus, due to the positive effect of companion midwives on maternal and neonatal labor outcomes and hospital performance indices and lack of need for costly medical intervention in most labors, an effort ought to be made to promote the use of companion midwives in labor to improve labor outcomes in all cities of the country. According to the results of limited studies in the field of companion midwife, this study suggests the presence of companion midwife in all medical centers and hospitals, so that in near future, we will witness the birth of healthy babies with good Apgar scores and labor without complications. Programs should be developed to provide an easy labor, and a reduction in cesarean section with the birth of healthy babies by using a midwife. We have taken an effective step toward reducing hospital costs and increasing the health of mothers and babies.

Conclusion

The presence of a companion midwife next to the mother in the labor room improves some of the maternal and neonatal labor outcomes, and also improves the performance indices of the hospital. It is recommended to carry out studies in this field along with examining mothers' satisfaction with companion midwives.

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Conflict of interests

The authors declared no conflict of interests.

Authors' contributions

Zarezadeh M designed research; Zareian F and Dafei M conducted research; Taheri Soodjani M analysis Data; and Mousavi SM and Zareian F and Raadabadi M wrote the paper, Mousavi SM had primary responsibility for final content. All Authors read and approved the final manuscript.

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