RESEARCH PAPER

# Assessment of Knowledge Regarding Umbilical Cord Clamping Among Staff Nurses

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**ABSTRACT**

Umbilical cord clamping (UCC) is a critical aspect of the third stage of labour and plays an essential role in neonatal physiological transition, circulatory stability, and iron reserve development. Although international bodies recommend delayed cord clamping (DCC) for its well-documented neonatal benefits, early cord clamping (ECC) continues to be widely practised in many healthcare settings, often due to inadequate knowledge and outdated clinical routines. As frontline providers in labour rooms, staff nurses significantly influence the actual timing of cord clamping. Assessing their baseline knowledge is therefore crucial for informing educational strategies and improving evidence-based neonatal care.

**Aim:** To assess the knowledge regarding umbilical cord clamping among staff nurses working in selected hospitals of Jaipur, Rajasthan.

**Methods:** A descriptive cross-sectional study was conducted among 300 registered staff nurses posted in selected hospitals in Jaipur. Purposive sampling was used to recruit participants based on preset eligibility criteria. Data were collected using a validated and reliable structured knowledge questionnaire on umbilical cord clamping along with a demographic profile sheet. After obtaining informed consent, data were gathered within clinical settings. Descriptive and inferential statistics, including frequencies, percentages, means, standard deviations, and chi-square tests, were applied. A p-value $< 0.05$ was considered statistically significant.

**Results:** The study revealed inadequate knowledge among staff nurses, with 42% demonstrating poor knowledge, 56% average knowledge, and only 2% exhibiting good knowledge regarding umbilical cord clamping. The mean knowledge score was $12.62 \pm 4.72$, indicating limited conceptual understanding of recommended clamping practices and associated neonatal benefits. Significant associations were identified between knowledge levels and demographic variables such as educational qualification, total nursing experience, timing of previous training, and job designation ($p < 0.05$).

**Conclusion:** The findings indicate substantial gaps in knowledge related to umbilical cord clamping among staff nurses in the selected hospitals of Jaipur. These deficiencies underscore the urgent need for structured training programs, updated clinical protocols, and ongoing capacity-building initiatives to strengthen evidence-based practices and improve neonatal outcomes.

**Key words:** Umbilical cord clamping, Delayed cord clamping, Knowledge assessment, Staff nurses, Neonatal health

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## INTRODUCTION

Umbilical cord clamping (UCC) is a critical clinical step during the third stage of labour, influencing the newborn's transition from placental to independent respiration. The umbilical cord, composed of two arteries, one vein, Wharton's jelly, and an epithelial covering, supports fetal life by supplying oxygen, nutrients, and immunological factors [1]. The timing of cord clamping directly affects neonatal circulation, blood volume, and early physiological stabilization. Therefore, a clear understanding of when and why clamping should occur is essential for all birth attendants.

Historically, early cord clamping (ECC), defined as clamping within 30–60 seconds of birth, became routine practice, largely due to assumptions about maternal safety and convenience in busy labour rooms [2]. However, research increasingly shows that ECC may prematurely interrupt placental transfusion, depriving newborns of a significant portion of their blood volume, including iron stores and stem cells vital for circulatory stability and long-term development [3].

Over the past two decades, scientific evidence has shifted global recommendations toward delayed cord clamping (DCC). Randomized trials and systematic reviews highlight that DCC—waiting at least 30–60 seconds or until pulsations cease—improves

hemoglobin levels at birth and increases iron stores for up to six months in term infants while reducing intraventricular hemorrhage and necrotizing enterocolitis in preterm infants [3–5]. These findings have led WHO, ACOG, and NICE to endorse DCC for all vigorous term and preterm newborns [6–8].

Despite these clear guidelines, implementation varies widely, especially in low- and middle-income countries. Research from Nepal, Saudi Arabia, and India shows that many healthcare providers lack adequate knowledge about the physiology of placental transfusion, the benefits of DCC, and the current international recommendations [9–12]. Misconceptions such as fears regarding postpartum hemorrhage or neonatal jaundice—persist among nurses, affecting their clinical decision-making.

Since staff nurses frequently assist or conduct deliveries and initiate immediate newborn care, their knowledge regarding UCC is essential for safe, evidence-based practice. Insufficient knowledge can lead to premature cord clamping, increasing risks of neonatal anemia, hypovolemia, and impaired adaptation to extrauterine life [3,10]. Understanding nurses' current level of knowledge is therefore crucial for identifying gaps, correcting misconceptions, and designing appropriate educational strategies.

The present study is designed specifically to assess the knowledge of staff nurses regarding umbilical cord clamping in selected hospitals of Jaipur, Rajasthan.

### Need of the Study

Delayed umbilical cord clamping is recognized globally as a simple, evidence-based intervention that significantly improves neonatal outcomes. Yet, in many Indian maternity settings, the timing of cord clamping remains inconsistent, largely due to inadequate knowledge among healthcare providers, particularly staff nurses who play a key role in delivery care.

Studies conducted in India and neighbouring countries show that many nurses lack essential knowledge regarding:

- the physiological benefits of placental transfusion,
- recommended timing for cord clamping,
- advantages of DCC for term and preterm infants,
- current WHO and ACOG guidelines [9–12].

Knowledge deficits contribute to premature cord clamping, resulting in reduced neonatal blood volume, increased risk of anemia, lower iron stores, and impaired early adaptation. Misconceptions—such as concerns about postpartum hemorrhage, jaundice, or delays in resuscitation—continue to influence practice, even when scientific evidence supports the safety and superiority of delayed clamping.

Variation in educational backgrounds (GNM, BSc Nursing, PB BSc), limited exposure to updated guidelines, and lack of standardized institutional protocols further widen knowledge gaps. Since neonatal anemia and developmental delays remain significant public health challenges in India, strengthening nurses' knowledge of cord clamping becomes a low-cost, high-impact strategy to improve newborn health outcomes.

Assessing staff nurses' knowledge is essential to:

- identify gaps and misconceptions,
- align their understanding with current global and national guidelines,
- guide targeted training programs,
- support the development of standardized protocols within hospitals,
- enhance the safety and quality of newborn care.

Thus, evaluating the knowledge of staff nurses regarding UCC in selected hospitals of Jaipur is a necessary step toward improving evidence-based practices and optimizing neonatal health.

## METHODS

### Study Design

A descriptive cross-sectional research design was adopted to assess the knowledge of staff nurses regarding UCC. This design was appropriate as it enabled the researcher to obtain baseline information at a single point in time without introducing any intervention or altering existing clinical practices.

### Study Setting

The study was conducted in selected public and private hospitals of Jaipur, Rajasthan, India. These hospitals have functional labour rooms and maternity wards where staff nurses provide intrapartum and immediate newborn care, making them suitable settings for evaluating knowledge related to UCC.

### Study Population

The target population consisted of registered staff nurses (RN/RM) working in selected hospitals.

### Inclusion Criteria

- Registered staff nurses posted in in selected hospitals
- On active duty during the period of data collection
- Able to read and understand English
- Willing to participate and provide informed consent

### Exclusion Criteria

- Nurses not involved in intrapartum or immediate newborn care
- Student nurses, interns, or trainees

- Staff on leave or unavailable during the period of data collection
- Participants of the pilot study

**Sample Size and Sampling Technique**

A total of 300 staff nurses were selected using a non-probability purposive sampling technique. Nurses who met the eligibility criteria and consented to participate were included in the study.

**Development of Data Collection Tool**

A structured instrument was developed by the researcher to assess knowledge regarding UCC:

**1. Structured Knowledge Questionnaire**

A multiple-choice questionnaire was prepared to assess the nurses' understanding of:

- physiology of the umbilical cord and placental transfusion
- recommended timing of cord clamping
- benefits of delayed cord clamping for term and preterm infants
- WHO, ACOG, and national guideline recommendations on UCC
- contraindications and clinical considerations related to UCC

**2. Socio-demographic Proforma**

Collected information on age, qualification, years of experience, maternity experience, and prior exposure to training or information on UCC.

**Validity and Reliability of the Tool**

Content validity was established through expert review by five professionals specializing in obstetric nursing, neonatal nursing, medical–surgical nursing, nursing education, and biostatistics. Reliability of the knowledge questionnaire was assessed on 30 staff nurses using the split-half method, yielding an acceptable reliability coefficient of r = 0.7605, indicating good internal consistency.

**Pilot Study**

A pilot study was conducted on 30 staff nurses (10% of sample size) to evaluate feasibility, clarity of items, and time required for completion. Minor modifications in wording and sequence were made based on feedback. The pilot participants were excluded from the main study.

**Data Collection Procedure**

Data were collected over a predetermined period using the validated knowledge questionnaire. The researcher approached staff nurses individually during their duty hours, explained the purpose of the study, assured confidentiality, and obtained written informed consent. Participants completed the questionnaire in 15–20 minutes in a quiet area without disturbance.

**Data Analysis**

Data were coded and analyzed using statistical software.

**Descriptive Statistics:**

- Frequency, percentage, mean, and standard deviation were used to describe demographic variables and knowledge scores.

**Inferential Statistics:**

- The Chi-square test was used to determine the association between knowledge level and selected demographic variables.
- A p-value $< 0.05$ was considered statistically significant.

**Ethical Considerations**

Ethical approval was obtained from the Institutional Ethics Committee. Permission to conduct the study was secured from hospital authorities.Participation was voluntary, and anonymity and confidentiality of responses were maintained through coded questionnaires. Participants were informed of their right to withdraw from the study at any time without penalty.

## RESULTS

### SECTION I: DEMOGRAPHIC PROFILE

The demographic profile of the staff nurses was assessed to understand the background characteristics that may influence their knowledge regarding umbilical cord clamping. The distribution across variables such as age, gender, qualification, residence, work experience, maternity experience, previous training, and job designation provides essential context for interpreting the knowledge outcomes.

The majority of the participants belonged to the 31–40 years age group (54.67%), followed by 44% aged ≤30 years, while only 2 nurses were above 40 years. This indicates a predominantly young and mid-career nursing workforce in private hospitals of Jaipur.

The gender distribution showed 58% male and 42% female nurses, reflecting changing workforce patterns in private-sector healthcare settings in Rajasthan. With regard to educational background, most participants were GNM-qualified (66%), followed by PB B.Sc Nursing (17%) and B.Sc Nursing graduates (12%), while no participants held a postgraduate nursing degree. This suggests that many nurses may not have had extensive theoretical exposure to obstetric and neonatal physiology during their initial training.

A large proportion of participants were from urban areas (81.33%), consistent with the study setting. In terms of professional experience, 47.33% had 6–10 years of service as registered nurses, while 41.33% had 0–5 years of experience. However, 76.67% had less than 5 years of experience in maternal–neonatal care, indicating limited specialized exposure.

Most participants worked in private hospitals (98.67%), and nearly 89% reported "other sources"—such as colleagues or informal discussions—as their previous source of information on cord clamping. Slightly more than half of the nurses (54.67%) had never received formal training in cord clamping, and among those trained, many had outdated or infrequent training exposure. The majority held the job title of nursing officer (94.67%).

Overall, the demographic characteristics suggest that while the workforce is active and clinically engaged, there are substantial gaps in formal education, structured training, and updated knowledge resources related to umbilical cord clamping. These factors likely contribute to variations in knowledge levels among staff nurses.

**SECTION II: KNOWLEDGE LEVEL REGARDING UMBILICAL CORD CLAMPING**

**Table 1: Knowledge Score**

| Level of Knowledge | Frequency (f) | Percentage (%) |
|---|---|---|
| Poor | 21 | 42 |
| Average | 28 | 56 |
| Good | 1 | 2 |
| Mean ± SD | 12.62 ± 4.72 | |

The assessment of knowledge revealed that the majority of staff nurses had inadequate to average knowledge regarding umbilical cord clamping. More than half of the participants (56%) demonstrated only average knowledge, indicating partial understanding of essential concepts such as physiological benefits of delayed cord clamping, recommended timing, and international guidelines.

A considerable proportion (42%) fell under the poor knowledge category, reflecting significant gaps in understanding fundamental aspects of cord physiology, timing protocols, and neonatal implications of early versus delayed clamping. Only one participant (2%) achieved good knowledge, suggesting that strong conceptual clarity was extremely limited within the sample.

The mean score of 12.62 ± 4.72 further confirms the overall low baseline knowledge among the staff nurses. These findings highlight the lack of systematic exposure to updated maternity–neonatal guidelines and underscore the importance of structured educational interventions to improve clinical knowledge in this crucial area of newborn care. (Table 1).

**SECTION III: ASSOCIATION BETWEEN KNOWLEDGE AND DEMOGRAPHIC VARIABLES**

**Table 2: Association between knowledge score with selected demographic variables among staff nurses.**

| Knowledge score | Average Knowledge | Good Know ledge | Poor Know ledge | df | chi square table value | chi square cal. Value | p value | Remark |
|---|---|---|---|---|---|---|---|---|
| **Age (in years)** | | | | | | | | |
| ≤ 30 | 38 | 1 | 27 | 6 | 12.59 | 4.586 | 0.598 | NS |
| 31-40 | 41 | 8 | 33 | | | | | |
| 41-50 | 1 | 0 | 1 | | | | | |
| >50 | 0 | 0 | 0 | | | | | |
| **Gender** | | | | | | | | |
| Male | 47 | 5 | 35 | 4 | 9.48 | 0.5 | 1 | NS |
| Female | 33 | 4 | 26 | | | | | |
| Transgender | 0 | 0 | 0 | | | | | |
| **Qualification** | | | | | | | | |
| GNM | 51 | 3 | 45 | 6 | 12.59 | 12.91 | 0.44 | S |
| PB B.Sc Nursing | 17 | 6 | 13 | | | | | |
| B.Sc Nursing | 12 | 0 | 3 | | | | | |
| M.Sc. Nursing/others | 0 | 0 | 0 | | | | | |
| **Residence** | | | | | | | | |
| Urban | 63 | 7 | 52 | 4 | 9.48 | 1.32 | 0.971 | NS |
| Rural | 16 | 2 | 8 | | | | | |
| Semi urban | 1 | 0 | 1 | | | | | |
| **Experience as a registered nurse (in years)** | | | | | | | | |
| 0- 5 | 35 | 1 | 26 | 6 | 12.59 | 13.69 | 0.033 | S |
| 6-10 | 37 | 4 | 30 | | | | | |
| 11-15 | 8 | 4 | 4 | | | | | |
| More than 15 | 0 | 0 | 1 | | | | | |
| **Experience in maternal and neonatal care (in years)** | | | | | | | | |
| 0- 5 | 64 | 6 | 45 | 6 | 12.59 | 1.286 | 0.972 | NS |
| 6-10 | 16 | 3 | 16 | | | | | |
| 11-15 | 0 | 0 | 0 | | | | | |
| More than 15 | 0 | 0 | 0 | | | | | |
| **Type of health care facility in which you are working** | | | | | | | | |
| Public hospital | 0 | 0 | 0 | 6 | 12.59 | 0.049 | 1 | NS |
| Private hospital | 79 | 9 | 60 | | | | | |
| Community health centre | 0 | 0 | 0 | | | | | |
| Others (please specify) | 1 | 0 | 1 | | | | | |
| **Any previous source of information regarding umbilical cord clamping** | | | | | | | | |
| Newspaper | 5 | 1 | 5 | 6 | 12.59 | 1.43 | 0.964 | NS |
| Magazine | 1 | 0 | 0 | | | | | |
| Television | 2 | 0 | 3 | | | | | |
| Others | 72 | 8 | 53 | | | | | |
| **Any formal training in cord clamping procedures** | | | | | | | | |
| Yes | 36 | 3 | 29 | 2 | 5.99 | 0.647 | 0.724 | NS |
| No | 44 | 6 | 32 | | | | | |
| **If yes, timing of training** | | | | | | | | |
| Less than 1 year | 32 | 1 | 24 | 6 | 12.59 | 17.66 | 0.007 | S |
| 1-3 years ago | 4 | 1 | 5 | | | | | |
| More than 3 years ago | 0 | 1 | 0 | | | | | |
| Not applicable | 44 | 6 | 32 | | | | | |
| **Current job designation** | | | | | | | | |
| Nursing officer | 77 | 7 | 58 | 6 | 12.59 | 17.11 | 0.009 | S |
| Ward incharge | 3 | 1 | 2 | | | | | |
| Supervisor | 0 | 1 | 0 | | | | | |
| Others | 0 | 0 | 1 | | | | | |

The association analysis between knowledge and demographic variables revealed that most variables such as age, gender, residence, type of facility, maternal-neonatal experience, previous information sources, and formal training did not show significant relationships with knowledge levels. This indicates that poor knowledge was uniformly distributed across the demographic spectrum.

However, significant associations were found in the following variables:

**1. Educational Qualification**

Qualification was significantly associated with knowledge levels ($p = 0.044$). Diploma nurses (GNM) exhibited poorer knowledge compared to PB B.Sc and B.Sc graduates. Higher academic qualifications correlated with better conceptual understanding, suggesting that degree education enhances theoretical clarity on obstetric procedures.

**2. Total Nursing Experience**

Years of experience as a registered nurse showed a significant association ($p = 0.033$), with those having 6–10 years of experience demonstrating slightly better knowledge. Early-career nurses (0–5 years) had poorer knowledge, possibly due to limited exposure, while nurses with >10 years may rely on outdated practices.

**3. Timing of Training**

A highly significant association ($p = 0.007$) indicated that nurses who had undergone recent training (<1 year ago) showed better knowledge. This demonstrates the importance of frequent refresher training sessions.

**4. Current Job Designation**

Job designation also showed a significant association ($p = 0.009$), with ward in-charges and supervisors displaying better knowledge compared to nursing officers. This reflects greater responsibility and exposure to updated protocols among senior staff (Table 4).

**Overall Summary**

Knowledge regarding umbilical cord clamping among staff nurses was generally inadequate, with 98% scoring at poor or average levels.

- Only 1 nurse (2%) demonstrated good knowledge.
- Significant associations were found with qualification, total experience, timing of training, and job designation.
- Most demographic variables did not influence knowledge, suggesting a pervasive knowledge gap.

These findings highlight a strong need for structured educational programs, updated protocols, and regular in-service training to improve nurses' knowledge of evidence-based cord clamping practices.

## DISCUSSION

The present study assessed the knowledge of staff nurses regarding umbilical cord clamping (UCC) in selected private hospitals of Jaipur, Rajasthan. The findings clearly reveal substantial gaps in baseline knowledge related to the timing, physiology, and evidence-based recommendations of UCC. With 42% of nurses demonstrating poor knowledge and 56% exhibiting only average knowledge, the results indicate that many nurses lack adequate conceptual understanding of cord physiology, benefits of delayed cord clamping (DCC), and current WHO and ACOG guidelines. The overall mean knowledge score of $12.62 \pm 4.72$ confirms the need for strengthened educational approaches.

These findings are consistent with existing literature from India and abroad. A study by Kc et al. in Nepal reported that nurses lacked familiarity with global recommendations and continued early clamping due to insufficient conceptual clarity [9]. Similarly, Alenazi et al. in Saudi Arabia found that obstetric nurses possessed limited baseline knowledge regarding placental transfusion and DCC despite frequent involvement in deliveries [10]. Andersson et al. also emphasized that inadequate understanding of the physiology of placental transfusion contributes significantly to the persistence of early clamping practices even in well-resourced health systems [11].

The present study also identified significant associations between knowledge levels and specific demographic variables. Educational qualification showed a significant relationship ($p = 0.044$), with B.Sc and PB B.Sc Nursing graduates demonstrating better knowledge compared to GNM-qualified nurses. This supports earlier evidence suggesting that degree-prepared nurses receive stronger theoretical grounding in obstetric physiology and evidence-based neonatal care [15].

Total nursing experience was significantly associated with knowledge ($p = 0.033$), with nurses having 6–10 years of experience scoring better than early-career nurses. This trend aligns with studies indicating that moderate clinical exposure enhances knowledge acquisition, whereas very long or very short experience may limit current understanding due to outdated training or limited exposure [16].

Timing of training also showed a highly significant association ($p = 0.007$). Nurses who had undergone recent training (<1 year) demonstrated higher knowledge levels, highlighting the importance of regular refresher sessions. This finding is supported by Ibrahim et al., who reported that periodic professional development strongly influences clinicians' familiarity with updated guidelines [17].

Job designation was another variable significantly associated with knowledge ($p = 0.009$). Senior nurses such as ward in-charges and supervisors showed comparatively better knowledge than nursing officers. This is likely attributed to their involvement in

supervisory responsibilities, protocol implementation, and greater exposure to clinical updates.

Conversely, variables such as age, gender, residence, prior information sources, and type of healthcare facility did not exhibit significant association with knowledge scores. This uniformity indicates that inadequate knowledge is not confined to a specific demographic subgroup but represents a system-wide gap across nursing staff. Such widespread deficits emphasize the need for institutional strategies to enhance knowledge of essential procedures such as UCC.

The present findings highlight an urgent need for structured and standardized educational interventions. Evidence shows that training modules focused on the physiology of placental transfusion, benefits of DCC, and guideline-recommended timing significantly improve nurses' knowledge and correct misconceptions [15]. Without adequate knowledge, nurses may be unable to align their practice with international recommendations, potentially affecting neonatal outcomes such as anemia, hypovolemia, and impaired transition at birth.

Overall, the study underscores the critical importance of improving nurse education on UCC through regular in-service training, updated institutional protocols, skill labs, and continuous professional development programs. Strengthening knowledge is a crucial first step toward improving clinical decision-making and ensuring the safe, evidence-based care essential for optimal maternal and neonatal health.

## CONCLUSION

The findings of the present study indicate that staff nurses working in selected hospitals of Jaipur possess inadequate knowledge regarding umbilical cord clamping, with the majority demonstrating only average understanding and a substantial proportion showing poor conceptual clarity. These results, consistent with national and international literature, reflect significant gaps in awareness of physiological principles, recommended timing, and the evidence-based benefits of delayed cord clamping. The study highlights that demographic factors such as qualification, nursing experience, recent training, and job designation influence knowledge levels, underscoring the critical role of continuous professional development. Overall, the inadequate awareness identified in this study emphasizes the urgent need for structured educational programs, standardized protocols, and regular refresher training to strengthen nurses' knowledge and promote safe, evidence-based neonatal care practices.

**Conflict of Interest:** The authors certify that they have no involvement in any organization or entity with any financial or non-financial interest in the subject matter or materials discussed in this paper.

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## REFERENCES

1. Benirschke K, Burton GJ, Baergen RN. *Pathology of the Human Placenta*. 6th ed. Springer; 2012.
2. Rabe H, Diaz-Rossello JL, Duley L, Dowswell T. Effect of timing of umbilical cord clamping on maternal and neonatal outcomes. *Cochrane Database Syst Rev.* 2012;(8):CD004074.
3. Andersson O, Hellström-Westas L, Andersson D, Domellöf M. Effect of delayed vs early umbilical cord clamping on infant iron status at 4 months: A randomized clinical trial. *BMJ.* 2011;343:d7157.
4. Polglase GR, Miller SL, Barton SK, et al. Physiological benefits of delayed cord clamping in preterm infants. *Front Pediatr.* 2014;2:451.
5. Chaparro CM, Neufeld LM, Tena Alavez G, et al. Effect of timing of umbilical cord clamping on iron status of Mexican infants. *Lancet.* 2006;367(9527):1997–2004.
6. World Health Organization. *Delayed Umbilical Cord Clamping for Improved Maternal and Infant Health and Nutrition Outcomes*. Geneva: WHO; 2014.
7. American College of Obstetricians and Gynecologists. Committee Opinion No. 684: Delayed umbilical cord clamping after birth. *Obstet Gynecol.* 2017;129(1):e5–e10.
8. National Institute for Health and Care Excellence (NICE). *Intrapartum Care for Healthy Women and Babies*. NICE Clinical Guideline; 2017.
9. Kc A, Wrammert J, Clark RB, Ewald U, Målqvist M. Uptake and barriers of delayed cord clamping in Nepal. *BMC Pregnancy Childbirth.* 2019;19:355.
10. Ibrahim NO, Al-Saif S, Al-Zahrani A, Abu-Sulaiman A. Knowledge and attitudes of nurses toward delayed umbilical cord clamping in Saudi Arabia. *J Obstet Gynaecol.* 2017;37(6):789–793.
11. Alenazi SA, Kamal Y, Alruwaili S. Nurses' knowledge and practices regarding delayed cord clamping in Saudi Arabia. *J Neonatal Nurs.* 2019;25(4):194–198.
12. Sachdev R, Kumar Y, Chawla D. Changing trends in umbilical cord clamping practices in India: A comparison with WHO recommendations. *Indian Pediatr.* 2020;57(4):338–342.
13. Andersson O, Domellöf M. Delayed cord clamping improves iron stores in infants. *BMJ.* 2011;343:d7157.
14. World Health Organization. Guideline: Optimal timing of cord clamping. Geneva: WHO Press; 2014.
15. Al-Wassia H. Timing of cord clamping: Neonatal outcomes and practice barriers. *J Neonatal Med.* 2017;10(2):150-156.
16. Ibrahim NO, Al-Mousa A. Nurses' perception of delayed cord clamping: A regional study. *J Obstet Gynaecol.* 2017;37(4):510-516.

17. Hooper SB, Binder-Heschl C, Polglase GR. Cardiopulmonary transition and cord clamping. *J Physiol.* 2015;593(8):2127-2141.