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Healthcare workers knowledge attitudes and practices regarding labor analgesia in Shaanxi Province China

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Awareness of labor analgesia among healthcare workers (HCWs) may be suboptimal. To evaluate the knowledge, attitudes, and practices of HCWs regarding labor analgesia. This cross-sectional study enrolled HCWs (obstetricians, anesthesiologists, midwives, and nurses) at hospitals in Shaanxi Province (October 2022 to December 2022). The questionnaires designed for the HCWs contained four dimensions (demographic information, knowledge, attitude, and practice). Factors associated with dimension scores were identified by multivariate logistic regression analysis. The analysis included 402 HCWs. The average knowledge, attitude, and practice scores were 7.3 ± 1.1 points (possible range, 0–9 points), 33.0 ± 4.7 points (possible range, 8–40 points), and 11.8 ± 2.7 points (possible range, 3–15 points), respectively, for the HCWs. Specific deficits in knowledge, attitudes, and practices were identified for the HCWs. Factors independently associated with higher knowledge scores and higher attitude scores for HCWs included working as an anesthetist and working in an institution offering labor analgesia ($P < 0.05$). Attitude scores > 70% of the maximum and working in an institution with a standardized labor analgesia protocol were associated with a higher practice score for HCWs ($P < 0.05$). These findings may facilitate the design of targeted education/training programs to raise awareness about labor analgesia.

Keywords Parturition, Analgesia, obstetric, Anesthesia, epidural, Healthcare workers, Surveys and questionnaires, Health knowledge, attitudes, practice

Abbreviations

HCWs	Healthcare workers
KAP	Knowledge, attitude and practice
BMI	Body mass index
VIF	Variance inflation factor
ORs	Odds ratios
NPLD	No pain labor and delivery

Childbirth is a physiological process that is associated with severe pain[1]. The perception of pain during labor is influenced by a variety of factors, and previous studies have reported that higher pain ratings are associated with younger age, older gestational age, larger infant size, longer duration of labor, maternal anxiety, and higher level of education[1–3]. Healthcare workers (HCWs) are the main actors in helping women cope with pain during delivery through teaching coping methods, counseling, support, encouragement, and providing analgesia[4].

HCWs have various nonpharmacologic and pharmacologic strategies available for helping women manage their pain during childbirth[4–7]. The pharmacologic options for analgesia during childbirth include inhalational agents such as nitrous oxide[8] and sevoflurane[9], parenteral opioids such as remifentanil[10], and neuraxial analgesia such as epidural, combined epidural-spinal, continuous spinal, and epidural with dural puncture[11]. The selection

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of the appropriate pain relief strategy needs to consider the stage/progression of labor, local safety protocols, and potential adverse effects on the mother and child, and it is important that the pregnant woman participates fully in the decision-making process[12].

The optimal management of labor pain by HCWs requires a solid understanding of the available analgesia methods, their indications, and their safety profiles. Globally, studies have shown that healthcare workers' knowledge of labor analgesia varies widely, with many providers lacking adequate familiarity with available techniques, safety considerations, and implementation protocols. However, many HCWs may hold incomplete or outdated knowledge regarding these techniques, which can affect their clinical judgment and patient communication[13,14]. In particular, gaps remain in understanding the optimal timing for initiating analgesia, the relative safety of neuraxial techniques, and the appropriate indications for different pain management options. These deficiencies may contribute to underutilization and miscommunication in clinical settings.

Furthermore, some HCWs believe that analgesia for labor pain can harm the baby or have other adverse effects, such as increasing the risk of cesarean Sects.[13,14]. In addition, some women may refuse pain relief during childbirth for cultural reasons[15,16]. The labor analgesia rate in China is low and varies between regions, from 30.77% in east China to as low as 1.02% in northwest China[17]. China has one of the highest cesarean section rates in the world (45.2% in 2018)[18], and the reasons for this are thought to include fear of pain during childbirth, variations in labor analgesia availability, and misconceptions among healthcare providers that epidural analgesia can harm the mother and baby[17,19]. A national survey involving 42 maternity hospitals and over 1.4 million deliveries revealed a wide disparity in regional analgesia rates, ranging from 30.77% in east China to only 1.02% in northwest China, highlighting urgent needs for resource allocation and standardization[20]. Despite early efforts to promote labor analgesia in China, its widespread implementation has been hindered by non-technical barriers such as insufficient anesthesia personnel, lack of standardized training, cultural resistance, and inadequate institutional and policy support [Wu et al., 2020]. Identifying and addressing these barriers is crucial for improving healthcare providers' awareness and facilitating the uptake of labor analgesia Having a good knowledge of labor pain management among HCWs is essential since HCWs are often the primary source of medical information for patients.

Knowledge, attitude, and practice (KAP) surveys provide important insights into the baseline knowledge, attitudes, beliefs, misconceptions, and behaviors toward a health-related topic[21]. The information yielded by KAP surveys can help guide the development and implementation of education and training programs to overcome issues and barriers to the utilization of an intervention[21]. Therefore, the aim of this cross-sectional study was to evaluate the KAP of HCWs regarding labor analgesia. By identifying specific areas of misunderstanding or deficiency, this study seeks to provide evidence to inform targeted educational strategies and institutional improvements. In doing so, it aims to fill the knowledge gap that may hinder effective communication with patients and limit the implementation of labor analgesia in clinical practice.

Methods

Study design and participants

This cross-sectional, questionnaire-based study enrolled HCWs (including obstetricians, anesthesiologists, midwives, and nurses) at hospitals in China between October 2022 and December 2022. The inclusion criteria were: (1) being a certified anesthesiologist, obstetrician, nurse, or midwife; (2) providing informed consent to participate. Only currently employed staff were included. This study was approved by the Medical Ethics Committee of Shaanxi Provincial People's Hospital, and informed consent was obtained from all the study participants. A formal sample size calculation was not applied based on a fixed formula due to the exploratory nature of the study. Instead, the sample size was considered sufficient based on established guidelines for questionnaire-based studies, which recommend a sample size of 5–20 times the number of questionnaire items[22,23]. The final sample included 402 healthcare workers. A formal sample size calculation was not applied based on a fixed formula due to the exploratory nature of the study. Instead, the sample size was considered sufficient based on established guidelines for questionnaire-based studies, where an acceptable range is typically 5–20 times the number of questionnaire items. As our survey included over 20 measurable items, the sample size exceeded the minimum requirement and aligns with similar studies in healthcare populations.

Questionnaire design and administration

The questionnaire was designed with reference to surveys described in the published literature[13,24,25]. The relevant questionnaires were administered to 50 HCWs as a pre-test. The Cronbach's α coefficient was 0.7216, suggesting good internal consistency (i.e., good reliability)[26]. The final version of the questionnaire was in Chinese.

The questionnaire included four dimensions: demographic information, knowledge, attitude, and practice. The demographic information dimension consisted of 11 items that collected the following data: gender, age, type of hospital in which employed, education level, occupation, years of work experience, marital status, whether the respondent's institution offered labor analgesia, whether the respondent's institution had a standardized protocol for labor analgesia, whether the staff administering labor analgesia received standardized training, and whether the respondent's institution or government offered incentives for the use of labor analgesia. The knowledge dimension consisted of 9 items (K1–K9), each scored as 1 point for a correct answer and 0 points for an incorrect or unclear answer, resulting in a total score range of 0–9 points. This binary scoring method has been widely used in similar KAP studies because it allows for straightforward interpretation and comparison of participants' fundamental understanding of a topic[13,24]. In the context of labor analgesia, such scoring efficiently captures core factual knowledge, which is essential for informed clinical practice and communication with patients. The attitude dimension consisted of 8 items (A1–A8), each of which was scored using a 5-point Likert scale, as follows: items 4, 5, 7, and 8 were scored 5 points for "strongly agree", 4 points for "agree", 3 points for "neutral", 2 points for "disagree" and 1 point for "strongly disagree", while the reverse scoring system was used for the

other items. The total attitude score ranged from 8 to 40 points. The practice dimension contained 5 questions (P1–P5). Items P1–P3 were scored using a 5-point Likert scale ranging from 5 points ("always") to 1 point ("never"), and the total score for the practice dimension (range, 3–15 points) was calculated based on the scores for these three items. Items P4 and P5 of the practice dimension were not assigned a score, and the results are presented descriptively (Supplementary Questionnaire). To ensure data quality, questionnaires with extremely short (< 2 min) or long (> 15 min) completion times were excluded during data cleaning.

A professional online questionnaire software platform (Wenjuanxin; Changsha Ranxing Information Technology, Changsha, China) was used to design and create a link to the questionnaire, which was distributed via WeChat groups. To ensure the quality and completeness of the questionnaire results, each IP address could only be used once for submission, and all items had to be completed before submission was permitted. An Excel spreadsheet was exported from the questionnaire software platform. All questionnaires were checked for completeness, consistency, and validity by members of the research team.

Statistical analysis

Stata 17.0 (Stata Corporation, College Station, TX, USA) was used for the analysis. Continuous variables are presented as the mean ± standard deviation (SD). Normally distributed continuous variables were compared between groups using Student's t-test (two groups) or analysis of variance (three or more groups). Non-normally distributed continuous variables were compared between groups using the Mann–Whitney U-test (two groups) or the Kruskal-Wallis test (three or more groups). Multivariate logistic regression analysis was used to identify factors independently associated with the knowledge, attitude, and practice scores Variables with a statistically significant association ($P < 0.05$) in univariate analysis were included in the multivariate logistic regression, consistent with methods used in previous KAP studies[24,25]. When knowledge and attitude scores were used as independent variables (for example, in analyses exploring whether knowledge score or attitude score were factors influencing the practice score), they were dichotomized using a cut-off value of 70% of the maximum score. Variables were tested for collinearity by calculation of the variance inflation factor (VIF), and all variables with VIF < 2 were included in the final model. Odds ratios (ORs) and 95% confidence intervals (95%CIs) were calculated. $P < 0.05$ was considered statistically significant.

Results

Demographic characteristics of the participants

A total of 402 medical staff aged 33.5 ± 7.6 years old (333 females, 82.8%) participated in the survey. The demographic characteristics of the medical staff are shown in Table 1. The participants included 93 obstetricians/gynecologists (23.1%), 73 nurses (18.2%), 136 anesthetists (33.8%), and 100 midwives (24.9%), and the average duration of professional experience was 10.3 ± 8.3 years. Most of the respondents (357/402, 88.8%) were educated to a junior college or bachelor's degree level, and most worked in a secondary hospital (221/402, 55.0%) or tertiary hospital (175/402, 43.5%). Approximately three-quarters of the participants (302/402, 75.1%) were married. The majority of respondents indicated that their institution offered labor analgesia (316/402, 78.6%), had a standardized protocol for labor analgesia (337/402, 83.8%), and had a standardized training program for the staff who administered labor analgesia (342/402, 85.1%). Additionally, just over half the medical staff stated that incentives for the use of labor analgesia were provided by their hospital or the government.

Knowledge scores

The average knowledge score for the HCWs was 7.3 ± 1.1 points (possible range, 0–9 points), indicating that the respondents had a good level of knowledge about labor analgesia. The proportion of respondents giving correct answers to each of the 9 questions in the knowledge dimension ranged from 13.7% for item K9 to 99.5% for item K7 (Supplemental Table 1).

Subgroup analyses (Table 1) revealed that the knowledge score was significantly higher for medical staff who were male ($P < 0.001$) or had a higher education level ($P = 0.010$). Knowledge scores also varied according to occupation ($P < 0.001$), being highest for anesthetists, intermediate for midwives and obstetricians/gynecologists, and lowest for nurses. The knowledge score was also higher for medical staff working in institutions that offered labor analgesia ($P < 0.001$) and had a standardized protocol for labor analgesia ($P = 0.009$).

Attitude scores

The average attitude score for the HCWs was 33.0 ± 4.7 points (possible range, 8–40 points), suggesting that the participants had a positive attitude toward labor analgesia. The distributions of the responses to the 8 questions in the attitude dimension are summarized in Supplemental Table 2.

Comparisons between subgroups (Table 1) indicated that the attitude score was significantly higher for medical staff who were male ($P < 0.001$), married ($P = 0.006$), or had a higher education level ($P = 0.043$). Attitude scores also varied with occupation ($P < 0.001$), being highest for anesthetists, intermediate for midwives and obstetricians/gynecologists, and lowest for nurses. The attitude score was also higher for HCWs in institutions that offered labor analgesia ($P < 0.001$), had a standardized protocol for labor analgesia ($P = 0.016$), and provided standardized training to staff administering labor analgesia ($P = 0.028$). Additionally, the attitude score was higher when incentives for labor analgesia were not offered ($P = 0.002$).

Practice scores

The practice score for the medical staff averaged 11.8 ± 2.7 points (possible range, 3–15 points). As shown in Supplemental Tables 3, 300 respondents (74.6%) indicated that they encouraged pregnant women to select intraspinal analgesia if they were considered suitable for it (item P2), and 278 respondents (69.2%) stated that they took the initiative to educate pregnant women about labor analgesia (item P1). Furthermore, 264

Variable	*n* (%)/ mean ± SD	Knowledge score		Attitude score		Practice score	
		Mean ± SD	*P*	Mean ± SD	*P*	Mean ± SD	*P*
All medical staff	402 (100%)	7.3 ± 1.1		33.0 ± 4.7		11.8 ± 2.7	
Age (years)	33.5 ± 7.6	–		–		–	
Gender			< 0.001		< 0.001		0.078
Male	69 (17.2%)	7.7 ± 1.1		34.4 ± 5.2		12.3 ± 2.6	
Female	333 (82.8%)	7.2 ± 1.1		32.8 ± 4.5		11.7 ± 2.7	
Type of institution			0.077		0.482		0.076
Primary hospital	6 (1.5%)	6.2 ± 1.3		30.7 ± 6.6		9.7 ± 2.0	
Secondary hospital	221 (55.0%)	7.3 ± 1.3		33.3 ± 4.8		11.8 ± 2.8	
Tertiary hospital	175 (43.5%)	7.3 ± 1.0		32.9 ± 4.6		11.9 ± 2.6	
Education level			0.010		0.043		0.647
High school/technical secondary school	7 (1.7%)	7.1 ± 1.2		31.7 ± 2.8		11.3 ± 2.6	
Junior college/bachelor's degree	357 (88.8%)	7.2 ± 1.2		32.9 ± 4.8		11.8 ± 2.7	
Master's degree or above	38 (9.5%)	7.8 ± 0.7		34.7 ± 3.2		12.1 ± 2.5	
Occupation			< 0.001		< 0.001		0.001
Obstetrician and gynecologist	93 (23.1%)	7.1 ± 1.0		32.9 ± 3.9		11.8 ± 2.5	
Obstetrics and gynecology nurse	73 (18.2%)	6.7 ± 1.4		30.2 ± 4.8		11.1 ± 2.8	
Anesthetist	136 (33.8%)	7.7 ± 1.0		34.8 ± 4.3		11.7 ± 2.9	
Midwife	100 (24.9%)	7.3 ± 1.1		32.9 ± 4.8		12.6 ± 2.4	
Duration of professional experience (years)	10.3 ± 8.3	–		–		–	
Marital status			0.121		0.006		0.040
Unmarried/other	100 (24.9%)	7.4 ± 1.1		31.8 ± 5.2		11.4 ± 2.8	
Married	302 (75.1%)	7.2 ± 1.1		33.4 ± 4.5		12.0 ± 2.7	
Does respondent's institution offer labor analgesia?			< 0.001		< 0.001		< 0.001
Yes	316 (78.6%)	7.4 ± 1.0		33.8 ± 4.3		12.3 ± 2.3	
No	86 (21.4%)	6.6 ± 1.5		30.4 ± 5.1		10.0 ± 3.3	
Does respondent's institution have a standardized protocol for labor analgesia?			0.009		0.016		< 0.001
Yes	337 (83.8%)	7.4 ± 1.0		33.3 ± 4.6		12.3 ± 2.4	
No	65 (16.2%)	6.8 ± 1.6		31.5 ± 5.0		9.5 ± 3.0	
Does respondent's institution provide standardized training to the staff providing labor analgesia?			0.069		0.028		< 0.001
Yes	342 (85.1%)	7.3 ± 1.0		33.3 ± 4.6		12.2 ± 2.4	
No	60 (14.9%)	6.8 ± 1.7		31.7 ± 5.0		9.5 ± 3.2	
Does respondent's hospital or government provide any incentives for labor analgesia?			0.201		0.002		0.127
Yes	235 (58.5%)	7.2 ± 1.0		32.6 ± 4.6		12.1 ± 2.5	
No	167 (41.5%)	7.3 ± 1.3		33.7 ± 4.8		11.5 ± 3.0	

Table 1. Knowledge, attitude, and practice scores stratified according to the baseline characteristics of the participants. *SD* standard deviation.

respondents (65.7%) considered themselves to have up-to-date knowledge about labor analgesia (item P3). The most commonly preferred analgesia method (item P4) was epidural analgesia (188/402, 46.8%), followed by combined spinal-epidural analgesia (142/402, 35.3%) and support from a doula-assisted delivery (62/402, 15.4%).

Multivariate logistic regression analysis of factors associated with the dimension scores

The regression analysis revealed that working as an anesthetist (OR 3.4; 95% CI 1.8–6.2; $P < 0.001$ vs. working as an obstetrician/gynecologist) and working in an institution that offers labor analgesia (OR 2.5; 95% CI 1.3–4.8; $P = 0.008$) were independently associated with a higher knowledge score (Table 2). Furthermore, being married (OR 2.0; 95% CI 1.1–3.5; $P = 0.018$), working as an anesthetist (OR 2.4; 95% CI 1.3–4.7; $P = 0.008$ vs. working as an obstetrician/gynecologist) and working in an institution that offers labor analgesia (OR 2.1; 95% CI 1.1–4.0; $P = 0.024$) were independently associated with a higher attitude score (Table 2). Additionally, an attitude score > 70% of the maximum (OR 2.4; 95% CI 1.5–4.0; $P < 0.001$), male gender (OR 2.5; 95% CI 1.3–5.0; $P = 0.009$) and working in an institution that has a standardized protocol for labor analgesia (OR 4.3; 95% CI 1.3–13.9; $P = 0.015$) were associated with a higher practice score (Table 2).

Discussion

A notable finding of the present study was that the surveyed HCWs had good knowledge, positive attitudes, and good practices toward labor analgesia, although areas of deficiency were identified. Working as an anesthetist and

Dimension	Factor	OR (95%CI)	*P*
Knowledge score	Gender		
	Female	Ref.	
	Male	1.8 (0.9, 3.7)	0.084
	Occupation		
	Obstetrician and gynecologist	Ref.	
	Obstetrics and gynecology nurse	0.9 (0.4, 1.7)	0.637
	Anesthetist	3.4 (1.8, 6.2)	< 0.001
	Midwife	1.5 (0.8, 2.6)	0.205
	Does respondent's institution offer labor analgesia?		
	No	Ref.	
	Yes	2.5 (1.3, 4.8)	0.008
	Does respondent's institution have a standardized protocol for labor analgesia?		
	No	Ref.	
	Yes	1.2 (0.6, 2.5)	0.659
Attitude score	Knowledge score		
	0–70%	Ref.	
	70–100%	1.5 (0.9, 2.4)	0.129
	Gender		
	Female	Ref.	
	Male	1.3 (0.7, 2.5)	0.450
	Occupation		
	Obstetrician and gynecologist	Ref.	
	Obstetrics and gynecology nurse	0.7 (0.3, 1.5)	0.326
	Anesthetist	2.4 (1.3, 4.7)	0.008
	Midwife	1.1 (0.6, 2.2)	0.725
	Marital status		
	Unmarried/other	Ref.	
	Married	2.0 (1.1, 3.5)	0.018
	Does respondent's institution offer labor analgesia?		
	No	Ref.	
	Yes	2.1 (1.1, 4.0)	0.024
	Does respondent's hospital or government provide incentives for labor analgesia?		
	No	Ref.	
	Yes	0.6 (0.4, 1.0)	0.060

Continued

Dimension	Factor	OR (95%CI)	*P*
Practice	Knowledge score		
	0–70%	Ref.	
	70–100%	1.3 (0.8, 2.2)	0.231
	Attitude score		
	0–70%	Ref.	
	70–100%	2.4 (1.5, 4.0)	< 0.001
	Gender		
	Female	Ref.	
	Male	2.5 (1.3, 5.0)	0.009
	Occupation		
	Obstetrician and gynecologist	Ref.	
	Obstetrics and gynecology nurse	0.8 (0.4, 1.7)	0.517
	Anesthetist	0.7 (0.3, 1.4)	0.282
	Midwife	1.6 (0.9, 3.1)	0.127
	Does respondent's institution offer labor analgesia?		
	No	Ref.	
	Yes	0.9 (0.4, 1.8)	0.685
	Does respondent's institution have a standardized protocol for labor analgesia?		
	No	Ref.	
	Yes	4.3 (1.3, 13.9)	0.015
	Does respondent's institution provide standardized training to staff providing labor analgesia?		
	No	Ref.	
	Yes	1.6 (0.6, 4.8)	0.383

Table 2. Multivariate logistic regression analysis of factors associated with the dimension scores. *OR* odds ratio, *95% CI* 95% confidence interval.

working in an institution that offers labor analgesia were independently associated with higher knowledge and attitude scores, while higher attitude, male gender, and working in an institution with a standardized protocol for labor analgesia were associated with a higher practice score. Although the immediate clinical implications of the results are limited, the present study highlights the need for improving the KAP of HCWs toward labor pain by designing and implementing adequate education interventions. Then, a better KAP could translate into a better birth experience for the women.

To the best of our knowledge, this is the first survey to evaluate the knowledge, attitudes, and practices of medical staff in China regarding labor analgesia. Our results provide new insights into the knowledge, attitudes, and practices of HCWs in China regarding labor analgesia, and the findings may facilitate the design and implementation of education and training programs to raise awareness about labor analgesia and increase its use among pregnant women in China. Similar findings have been reported in other low- and middle-income countries, where knowledge and practice levels among healthcare providers were also found to be suboptimal. In turn, this may facilitate the main goal of the No Pain Labor & Delivery (NPLD) initiative, which is to achieve an increase in vaginal delivery rates by enhancing access to safe neuraxial analgesia in labor and thereby decreasing the cesarean delivery rate[19,27].

The HCWs surveyed in this study had a good level of knowledge of and positive attitudes toward labor analgesia. However, only 13.7% of the medical staff had adequate knowledge about the timing of labor analgesia, and it is possible that this knowledge gap might result in some women receiving suboptimal analgesia during labor. Overall, our results are in broad agreement with several previous studies[14,24,28–33] from lower- and second-tier countries, albeit with some variations evident between different countries. For instance, a study in Ethiopia found that only 36.6% of obstetric care providers reported providing labor analgesia, and utilization was strongly associated with knowledge and work experience, underscoring important gaps in practice[34].

According to the KAP survey, the HCWs in the present study had good practices overall. The majority of respondents preferred epidural or combined spinal-epidural as the analgesia method, took the initiative to educate pregnant women about labor analgesia, and encouraged pregnant women to select intraspinal analgesia if suitable. Surveys of medical staff in other countries have described poorer practices regarding labor analgesia. Barriers to the use of labor analgesia reported by HCWs in other surveys include lack of staff, equipment, and protocols, financial constraints, lack of knowledge and skills among medical staff, and safety concerns (e.g., prolongation of labor, maternal complications, and adverse effects on the fetus)[14,24,28,32].

Given that only one-third of the respondents in the present study considered themselves to have up-to-date knowledge about labor analgesia, we recommend the design and implementation of education and training programs to help improve the knowledge, attitudes, and practices of HCWs. Given the important role of midwives and obstetricians in disseminating knowledge to pregnant women during the antenatal period (including information about labor analgesia options and their relative advantages/disadvantages), it is crucial that these

education/training programs target this group of HCWs. Education/training programs should also be targeted at nurses since they have the lowest knowledge and practice scores and, thereby, have the potential to benefit the most. These education/training programs should cover deficits in knowledge, attitudes, and practices identified in this KAP survey, including the timing of labor analgesia, the benefits of labor analgesia to both mother and child, the safety of labor analgesia, and the importance of ensuring that pregnant women are fully aware of their analgesia options. In addition, it was noteworthy that higher dimension scores were obtained for HCWs who worked in an institution that offered labor analgesia and had a standardized protocol for labor analgesia. Therefore, we suggest that the introduction of standardized protocols and the implementation of measures to improve the availability of labor analgesia at individual institutions might also facilitate improvements in the knowledge, attitudes, and practices of HCWs regarding labor analgesia. Full engagement with the NPLD global health initiative[19,27] might help drive the improvements that are needed.

Limitations

First, the sample size was small; however, it is comparable to or exceeds those used in similar questionnaire-based studies and was adequate based on standard recommendations for KAP research, so the analysis may have lacked sufficient statistical power to detect some real differences between groups. Second, this was a single-center study, so the generalizability of the findings remains to be established. Third, although the KAP questionnaire was developed with reference to the published literature, it may have limitations in terms of its ability to evaluate perceptions regarding labor analgesia. Fourth, this study did not assess whether education/training programs would enhance the questionnaire scores.

Conclusion

The results of our study provide important insights into the KAP of HCWs in China regarding labor analgesia. We anticipate that the findings may help guide the development and implementation of education and training programs to improve awareness among both HCWs and thereby enhance the uptake of labor analgesia by pregnant women. Improving the KAP of HCWs could result in a better birth experience for the women.

Data availability

All data generated or analyzed during this study are included in this published article.

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Author contributions

J.Z. and L.J.Z. carried out the studies, participated in collecting data, and drafted the manuscript. X.Y., Z.B.Z., M.C., and Y.K.Z. performed the statistical analysis and participated in its design. J.Z., J.T.L., and J.W. participated in the acquisition, analysis, or interpretation of data and drafted the manuscript. All authors read and approved the final manuscript.

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Declarations

Ethics approval and consent to participate

The study was carried out after the protocol was approved by the Medical Ethics Committee of Shanxi Provincial People's Hospital (R065). All methods were performed in accordance with the relevant guidelines. All procedures were performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

Consent for publication

Written consent was given in writing by all subjects.

Competing interests

The authors declare no competing interests.

Additional information

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