

Describing the transition from late pregnancy into early labour – A prospective cohort study

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ABSTRACT

Objective: The time between self-assessed first symptoms and clinical confirmation of labour onset is marked by uncertainty, particularly for primiparas. Accordingly, primiparas often seek professional care to confirm their perceptions of labour onset. This paper describes the transition into early labour among primiparas considering their level of certainty in labour onset and their perception of labour onset symptoms prior to birth.

Methods: A prospective exploratory cohort study was conducted in Germany between July 2020 - March 2021 among a convenience sample of 69 primiparas. Respondents recorded in a non-validated questionnaire their perceptions of nine symptoms and degree of certainty about labour onset every day from 37 weeks gestation. Descriptive analysis included certainty in labour onset and dedicated symptoms in relation to days before birth.

Results: The participants ($n=69$) reported a little certainty of labour onset up to 32 days before birth and most of them became certain up to four days before birth. Associated symptoms were regular and irregular pain, symptoms of vaginal loss and emotional symptoms. Gastrointestinal symptoms and nausea were not indicated by a majority. Uncertainty of labour onset, however, was indicated up until the day of birth.

Conclusion: Although interpretation is based on a small sample size, primiparas are able to self-diagnose labour onset and report connected symptoms up to four days before birth. We suggest calling this time between self-diagnosis of labour onset and confirmed labour onset based on clinical parameters the transition into early labour.

Introduction

Since the adoption of hospital birth in the early 20th century, the clinical assessment of labour dynamics had relied on specific timeframes to distinguish between physiology and pathologic processes [2]. There is, however, no universally accepted standard definition for the onset of labour [2] posing challenges to healthcare professionals who diagnose labour onset. Nonetheless, labour onset marks the start of the latent phase of the first stage of labour, commonly referred to as early labour. This labour phase concludes with the active phase of the first stage of labour and is characterised by either regular or irregular painful uterine contractions, cervical ripening, and progressive dilatation of the cervix up to 4–6 cm or clinically confirmed fluid loss [2–5]. Existing clinical practice guidelines incorporate these criteria [6–8] assuming that women who do not experience painful contractions, cervical ripening, progressive dilatation, and/or clinically confirmed fluid loss may not yet

be in labour [6–8] and thus should remain outside labour wards to minimize unnecessary interventions [9,10]. While clinical confirmation of labour onset justifies seeking professional care, self-diagnosed labour onset is the initial trigger for care.

The period between self-diagnosed and clinically confirmed labour onset can be characterized as uncertain, as women are unable to independently assess cervical ripening and dilatation [3]. Similarly, accurate determination of fluid loss may pose a challenge. Therefore, women rely on subjective interpretation of symptoms to self-diagnose their labour onset [11–14]. These symptoms commonly include regular or recurrent pain, vaginal discharge (e.g. mucusy or bloody show, watery loss), emotional unrest or sleep disturbance, and gastrointestinal symptoms [15–18].

The self-diagnosis of labour onset is a particular difficult judgment for primiparas [3,13,18,19]. Edmonds et al. [13] found that primiparas who decided to go to the hospital early were uncertain about

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identifying labour onset and had difficulty coping with pain at home. In contrast, primiparas who decided to wait at home were more certain about their own assessment of labour onset and had better abilities to cope with pain [13]. Uncertainty regarding labour onset and interpretation of symptoms are fundamental problems at the beginning of labour, especially for primiparas [3,13,14]. Two recent studies from Switzerland give an in-depth insight into how women prepared for early labour including expectations and experiences, as well as the diversity of symptoms at this early stage of labour [18,19]. As part of the GebStart study [20], that is developing and validating an early labour assessment tool in Switzerland the authors highlight the need for a more individualised and transparent care and preparation for primiparas [18,19].

Various midwives, midwifery academics, and other stakeholders advocate for a more women-centred approach to labour onset [3,8,18,21]. More precision about women's experiences with labour onset and early labour is needed to support midwifery care that is women-centred and evidence-based [3,8,19,21]. Researchers have shown that women consider pregnancy and birth as a continuous process into parenthood, which should not be defined in phases, stages, and centimetres [19,21,22]. This stands in contrast with the perspectives of practice guidelines, which emphasize the need to define latent and active phase based on cervical dilatation [6–8]. However, to address these divergent perspectives between healthcare users and provider guidelines, it is crucial to support women in making sense of their birth experience, as demonstrated by qualitative research [14]. Thus, the subjective perspectives of women should guide the definition and diagnosis of labour onset [23–25].

Optimal maternity care requires an understanding of the women's experiences of early labour [26]. In fact, for primiparas, the duration of labour can last up to 5.8 days, including their perception of labour onset [17]. Braxton-Hicks contractions could be experienced as painful and sometimes primiparas interpret these for the onset of labour, which can occur as early as the second trimester [28]. Moreover, in a longitudinal cohort study uncertainty about labour onset was found to prolong the overall duration of early labour altogether [17]. This study with 1,170 participants ($n=611$ primiparas; $n=559$ multiparas) found the time difference between self-diagnosis and professional diagnosis of labour onset was a significant prognostic factor for the length of the first stage of labour in nulliparae [17].

To gain knowledge on primipara's labour onset and to be able to better support primiparas own perspective, it is necessary to assess their perceptions of early labour symptoms and when they occur. This paper describes the transition into early labour among primiparas considering their level of certainty in labour onset and their perception of labour onset symptoms prior to birth.

Methods

We used a prospective exploratory cohort study design and followed STROBE reporting guidelines (supplement material 1) [29]. The study was conducted in the region of Giessen, Germany, between July 2020 and March 2021 among a convenience sample of primiparous women, pregnant with singletons. The pilot-study was ethically approved by Hannover Medical School (# 7369) in March 2017 and tested the usability of the newly developed questionnaire. After minor alterations, the study was reconfirmed in February 2020. Each participant provided informed consent upon agreeing to participate in the study. Data collection was anonymous and data protection was confirmed by the data protection office of Hannover Medical School.

Participants, setting and procedure

Eligibility criteria included primiparous women prior to 37 completed gestational weeks expecting spontaneous onset of labour. In the pilot study a response rate of 40% was reached. Due to the start of the SARS-COV-2 pandemic a response rate of at least 20% was proposed. It was aimed to distribute not less than 150 and not more than 202 printed questionnaires with a stamped return envelope to eligible participants only. The recruitment of primiparas was anticipated in July 2020 through personal contact (HG) in antenatal classes in and around the region of Giessen, in the middle of the state of Hesse, Germany, by the main author. Due to the beginning of the SARS-COV-2 pandemic antenatal classes were often changed into online classes. Therefore, primiparas were also recruited through personal contact online ($n=22$ out of 41 distributed questionnaires; 20.3%). Unfortunately, many antenatal classes were closed to prevent infection in this vulnerable group, so it was not possible to reach primiparas personally. We therefore asked cooperating midwives via snowball sampling to distribute further questionnaires e.g. during antenatal check-ups ($n=47$ out of 161 distributed questionnaires; 79.7%). Data collection was closed when all questionnaires ($n=202$) were distributed in January 2021 (supplement material 2).

Data variables and sources

The questionnaire included three main sections. The first section included items on maternal factors including health status relevant to labour onset, age, height, and weight (BMI), nationality and level of education according to ISCED-2011 [27], and birth-associated factors (e.g., multiple pregnancies and estimated due date (EDD)). The second section included a daily questionnaire of nine possible labour onset symptoms: regular or irregular pain; mucous show; bloody vaginal loss; liquid vaginal loss; sleep disturbance; emotional unrest; nausea and other gastrointestinal symptoms (vomiting, diarrhoea). In addition to the symptoms, participants were asked to report information about their self-diagnosis and level of certainty regarding labour onset on a five-point Likert scale ('no'; 'yes a little'; 'yes, quite a lot'; 'yes, certainly'; 'not sure'). They were asked to fill in the symptoms and their certainty daily, starting from $\geq 37+0$ weeks of gestation until labour onset was confirmed or the baby was born. The third section included items from the official self-carried records (Mutterpass) reporting date, time and place of birth, APGAR scores, size, weight, head circumference and sex of the newborn. Participants were instructed to complete this section at a convenient time within four weeks after birth and return the questionnaire in the provided stamped returned envelope to the first author.

Data analysis

The statistical analysis was conducted using SPSS version 27.0. Initially, a descriptive data analysis was performed to examine the variables of the study.

First, the data was analysed based on the subjective certainty of labour onset for each day leading up to the day of birth (DOB). Subsequently, the description of all nine symptoms was provided without considering subjective labour onset. As each participant could experience multiple symptoms simultaneously, the symptoms that were reported by a majority ($> 50.0\%$) and then by one-third ($\geq 33.3\%$) of participants were identified.

Next, the certainty of labour onset was coded as binary (yes = a little, quite a lot, and certainly / no = no or not sure) and cross-tabulated with

the perceptions of each symptom. Since the symptoms were filtered based on subjective labour onset, only the symptoms indicated by participants along with a subjective labour onset (referred to as labour onset symptoms) were considered. Additionally, the analysis considered variations in the number of participants by the day before birth, considering the certainty of labour onset and the experience of multiple symptoms. Finally, the clustering of labour onset symptoms was examined to determine which symptoms may indicate labour onset in relation to the number of days before birth (DBB).

Results

From 202 distributed surveys we received 69 (34.2%) back, 22 (53.7%) after personal contact and 47 (29.2%) through midwifery contact. Most primiparas were less than 35 years of age and did not report any health conditions known to influence the timing of labour onset. Table 1 shows descriptive results based on the responses of primiparas for each respective question.

Prospective labour onset in primiparas

Participants completed the questionnaire within a range of up to 35 days before birth (DBB), with a median of 12 days, a mean of 12 days,

and a standard deviation of 7.94 (Graph 1). As the time approached closer to birth, participants' certainty regarding labour onset increased. The response "yes, a little" was reported up to 32 DBB, while "yes, quite a lot" was indicated by primiparas as their self-diagnosed labour onset up to 10 DBB. On the actual day of birth (DOB), 62.1% of primiparas ($n=18$) identified a possible labour onset as "yes, quite a lot". Primiparas expressed certainty in their labour onset as "yes, certainly" up to two DBB. Within these two days before birth, a higher percentage of women subjectively claimed labour onset compared to those who did not (53.3% vs. 46.7%). Nevertheless, participants continued to express uncertainty with the response "not sure" until the actual DOB. Graph 1 demonstrates that uncertainty starts to increase around 20 DBB and subsequently decreases as the actual date of birth approaches, while certainty gradually increases.

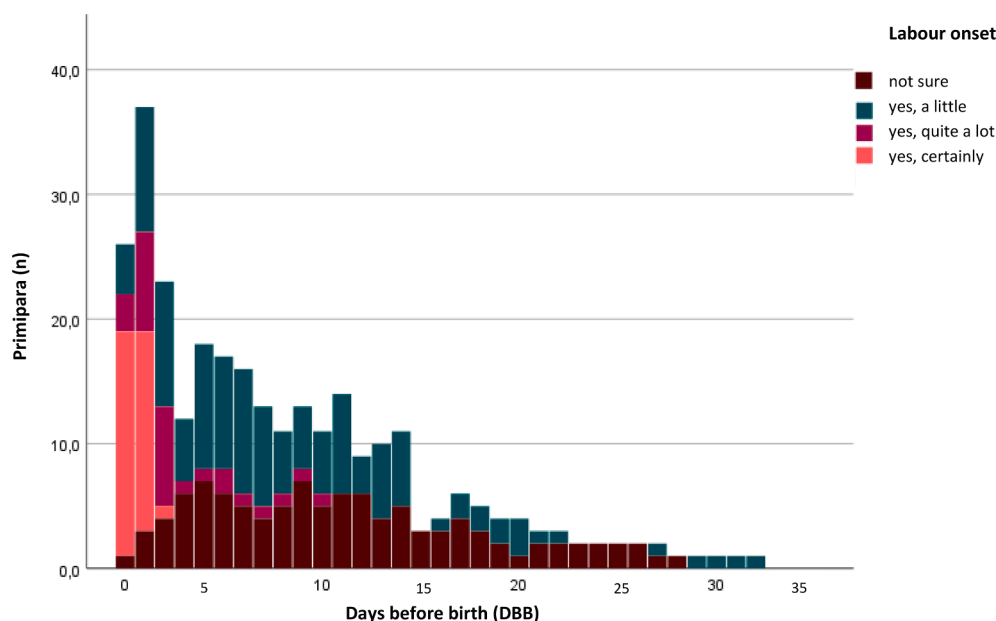
Indication of symptoms before birth

The participants completed the questionnaire about symptoms before birth up to 21 DBB, with at least half of all participants providing responses within this timeframe. During this period, we examined the symptoms that were experienced by the majority ($< 50.0\%$) and one third ($\geq 33.3\%$) of the respective sample. Within 21 DBB, the symptoms of "regular pain", "irregular pain", "mucousy show", and "sleep

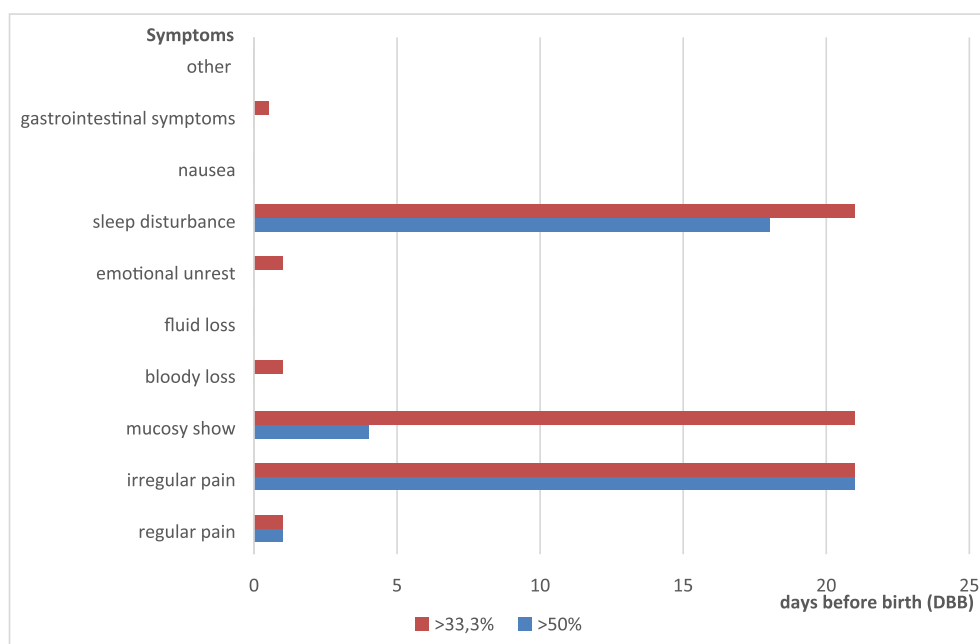
Table 1
Demographic characteristics of primiparas based on respective answers.

			n (%) missing data excluded			mean (SD)	
Maternal characteristics							
	Maternal age	<35 years	60 (86.8)			30.84 (3.92)	
		>34 years	9 (13.2)				
	Maternal BMI (n=65)	Underweight (BMI <18.5)	1 (1.5)				
		Normal (BMI 18.5–24.9)	27 (41.5)				
		Overweight (BMI 25–29.9)	23 (35.4)				
		Obesity I (BMI 30–34.9)	10 (15.4)				
		Obesity II (BMI 35–39.9)	4 (6.2)				
		Obesity III (BMI >40)	0 (0)				
	Nationality (n=69)	German	67 (97.1)				
		Eastern European	2 (2.8)				
		Other	0 (0)				
	Level of education (n=68)	Lower secondary	3 (4.4)				
		Upper secondary	3 (4.4)				
		Tertiary	17 (25.0)				
		Bachelor	11 (16.2)				
Master		29 (42.6)					
Doctoral title		5 (7.4)					
(according to ISCED-2011-Level (29))							
Birth associated factors*							
	Place of birth	<i>home^a; MLU^b; outpatient^c; hospital^d</i>	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	
		Planned place of birth (n=69)	2 (2.9)	11 (1.4)	1 (15.9)	55 (79.7)	
	Mode of birth	Actual place of birth (n=66)	1 (1.5)	7 (10.6)	0 (0)	58 (87.9)	
		<i>Vaginal^a; instrumental^b; secondary c/s^c; primary c/s^d</i>	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	
	Gestational age at birth (n=66)	Planned mode of birth (n=69)	69 (100)	0 (0)	0 (0)	0 (0)	
		Actual mode of birth (n=66)	44 (66.7)	5 (7.6)	16 (24.2)	1 (1.5)	
		Early term (37+0 - 38+6 wk)	11 (15.8)				
		Term (39+0 - 40+6 wk)	44 (67.0)				
		Late term (41+0 - 41+6 wk)	11 (15.8)				
		Post term (≥42 wk)	1 (1.4)				
	Newborn Factors						
		Birth weight (n=66)	Normal (2.5–4.5 kg)	66 (100)			
			SGA	0 (0)			
			Macrosomia	0 (0)			
		Sex (n=65)	Female	30 (46.2)			
Male			35 (53.8)				
5 min. APGAR score (n=64)		Normal (score 7–10)	59 (92.2)				
		Suspect (score 4–6)	4 (6.3)				
		Pathological (score <4)	1 (1.6)				
Head circumference (n=65)		Normal (33– 38 cm)	64 (98.5)				
		Small (<33 cm)	1 (1.5)				
		Big (>38 cm)	0 (0)				
Body length (n=66)		Normal (48–56 cm)	66 (100)				
		Short (<48 cm)	0 (0)				
		Long (>56 cm)	0 (0)				

* No multiple pregnancy.



Graph 1. Certainty of prospective labour onset.



Graph 2. Symptoms experienced by primiparas before birth.

disturbance” were experienced by the majority (>50.0%) of participants (Graph 2). On the other hand, the symptoms of “bloody vaginal loss”, “fluid loss”, “sleep disturbance”, “emotional unrest”, “nausea”, “gastrointestinal symptoms”, and “other symptoms” were not reported by the majority of participants.

Among the participants, at least one-third ($\geq 33.3\%$) reported the symptoms of “mucousy loss” and “sleep disturbance” up to 21 DBB (Graph 2). The symptoms of “bloody vaginal loss” and “emotional unrest” were indicated by one-third of participants one DBB before birth, while “gastrointestinal symptoms” were reported on the actual DOB. However, the symptoms of “fluid loss”, “nausea”, and “other symptoms” were never experienced by more than one-third of the participants.

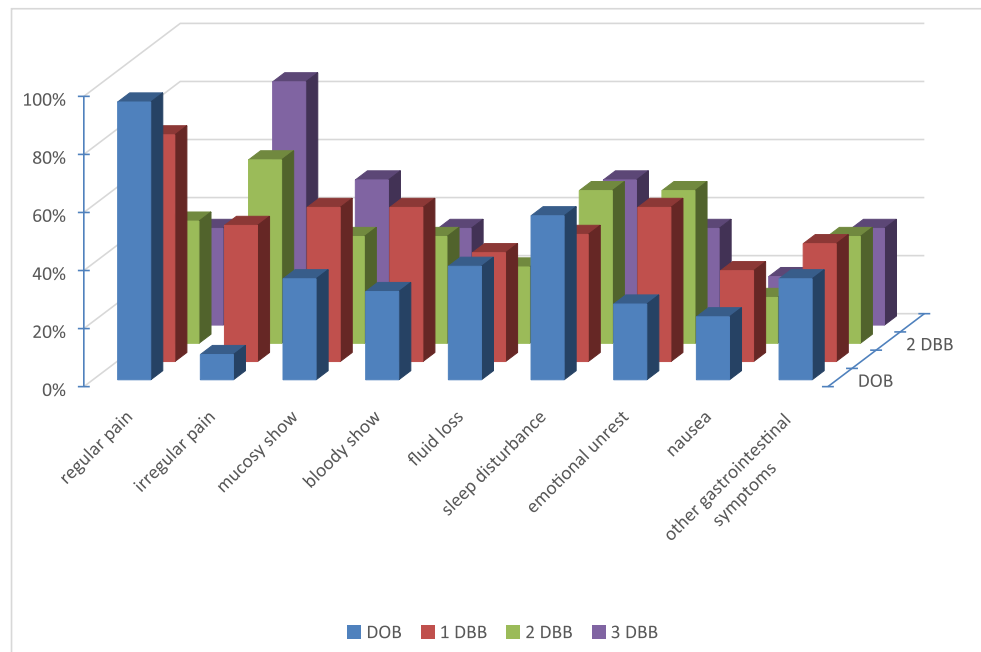
Subjective labour onset and symptoms

When considering the symptoms that were reported when a participant experienced a subjective labour onset (referred to as subjective labour onset symptoms), the pattern appears somewhat different. Table 2 and Graph 3 reveal that labour onset symptoms remain relevant up to four DBB. By looking at majorities (>50.0%), it becomes evident that all symptoms, except “fluid loss” and “nausea”, were indicated. When lowering the threshold to $\geq 33.3\%$ of participants’ experience, all labour onset symptoms, except “nausea”, were reported (Table 2; Graph 3). Particularly on the first and second day before birth, seven out of eight labour onset symptoms were indicated.

Table 2

Frequency of subjective labour onset symptoms in primiparas.

Symptom	DOB (n=23)		1 DBB (n=32)		2 DBB (n=19)		3 DBB (n=6)		4 DBB (n=10)	
	n	%	n	%	n	%	n	%	n	%
Regular pain	22	95.70%	25	78.10%	8	42.10%	2	33.30%	4	40.00%
Irregular pain	2	8.70%	15	46.90%	12	63.20%	5	83.80%	8	80.00%
Mucousy loss	8	34.80%	17	53.10%	7	36.80%	3	50.00%	5	50.00%
Bloody loss	7	30.40%	17	53.10%	7	36.80%	2	33.30%	2	20.00%
Fluid loss	9	39.10%	12	37.50%	5	26.30%	0	0%	0	0%
Sleep disturbance	13	56.50%	14	43.80%	10	52.60%	3	50.00%	7	70.00%
Emotional unrest	6	26.10%	17	53.10%	10	52.60%	2	33.30%	5	50.00%
Nausea	5	21.70%	10	31.30%	3	15.80%	1	16.70%	1	10.00%
Other gastro-intest.	8	34.80%	13	40.60%	7	36.80%	2	33.30%	5	50.00%

**Graph 3.** Frequency of subjective labour onset symptoms in primiparas.

Discussion

Certainty of labour onset

The decision of when and where to seek intrapartum care during early labour is primarily made by primiparas themselves. Their self-assessment and individual need for professional advice and care influences their decision to contact midwives. Our data demonstrates that primiparas may self-diagnose their labour onset up to 32 DBB, but the highest level of certainty in self-diagnosis occurs two days before birth (DBB). However, uncertainty in labour onset can persist up to 14 DBB and for some participants even persist until the DOB.

Previous research by Gross et al. [17] revealed that a small percentage of women who self-admitted in labour at term were inaccurately diagnosed by hospital staff. However, nearly 50% of these participants were confirmed to be in active labour within 24 hours. This suggests that primiparas may require midwifery care earlier than currently offered by most healthcare systems, leading to a possible gap in care between the subjective experience of labour onset and its clinical confirmation.

This transition into early labour highlights the need for quality guidance and reassurance for primiparous women during this period. Midwifery care is well-suited to address this need, as midwives possess essential competencies in professionalism, empathy, and care [8,30]. They can enhance women's self-confidence and can provide security through their expert knowledge, provide comprehensive antenatal education on birth settings, and care-seeking options. By offering reliable

midwifery care in preparation for the transition into early labour, primiparas' needs could be met prior to hospital admission.

Labour onset symptoms

Looking at symptoms without subjective labour onset we could show that "irregular pain", "mucousy show" and "sleep disturbance" is indicated by primiparas up to 21 DBB. This was also found by previous studies [17,18]. In order to interpret the progress of the transition into early labour the indication of early labour symptoms combined with the subjective certainty of labour onset could guide decision-making. A majority of primiparas in our small sample reported certain symptoms together with subjective certainty of labour onset, especially "regular" and "irregular pain". Here it can be observed that within four DBB the symptom "irregular pain" decreases in opposition to the symptom "regular pain" which increases in the last four DBB in combination with a subjective labour onset. However, most primiparas indicated a subjective labour onset within two DBB prospectively which is consistent with previous findings [13,17,19]. Hence, when irregular pain changes into regular pain primiparas may increasingly experience a subjective labour onset but may still have up to 48 hours ahead until giving birth. The diversity and individual recognition of symptoms have been confirmed by a very recent scoping review [18].

Moreover, our data show that the symptoms of "vaginal loss" (mucousy or bloody loss) and "emotional symptoms" (sleep disturbance or emotional unrest) were also indicated by most primiparas together

with a self-diagnosed labour onset within two DBB. This stands in line with midwifery knowledge and clinical diagnosis of labour onset [6,6,18]. Hence, if experiencing these symptoms primiparas may have a subjective labour onset but still have up to 48 hours ahead until giving birth. Interestingly, “fluid loss” was not indicated by a majority of participants at any day before birth which contradicts the defined onset of labour according to current practice guidelines [6,7] but has been reported in other studies before [15]. In order to prevent amniotic infection and ensure timely birth within 24 hours, it is important to address the occurrence of prelabour rupture of the membranes in a preventive way, as it is considered an indication of labour onset [6,7]. However, “gastrointestinal symptoms” and “nausea” have not been experienced by a majority together with subjective labour onset and may therefore not be as relevant in practice.

Our findings are consistent with studies that analysed labour onset symptoms before [13,15,17–19]. Although our convenience sample was small, we could show that primiparas recognize labour onset and corresponding symptoms up to four days before birth and suggest that a more diverse set of symptoms should be recognised within practice guidelines.

The transition into early labour

The period between self-diagnosed labour onset and clinically confirmed labour onset can be viewed as the transition into early labour. Introducing this terminology can help provide clarity and justification for midwifery care that focuses on meeting women’s needs during this crucial stage. It is important to include early assessment and support at home by a professional midwife, aiming to help primiparas enter the first stage of labour with a positive and optimistic mindset and to prevent adverse outcomes later in the labour process.

Offering early assessment and care during labour, ideally at the time when women truly need it – not too early and not too late – has the potential to improve birth outcomes and enhance women’s birth experiences. Previous research has emphasized the positive impact of timely and appropriate care in labour, highlighting its role in achieving better birth outcomes and promoting positive experiences [4,10,13,13,19,31].

Strengths and limitations

As to our knowledge, this is the first study that documented prospective labour onset data from primiparas daily with exact time documentary. The non-validated questionnaire was distributed in the German language and needed to be filled in continuously from 37+0 weeks gestation which hindered non-German speakers and illiterate people to participate in this study. Moreover, filling in a questionnaire in the last days before birth and right after birth could be challenging for primiparas and may have caused missing data. However, we can report that the respondents were willing to participate and fill in the study questionnaire continuously for up to 35 days before birth, demonstrating feasibility of the method. Also, after birth the participation was high. Unfortunately, it was not possible to systematically reach all members of the target population in the region due to the SARS-COV-2 pandemic as personal contacts were restricted and online antenatal classes not yet established or offered. Therefore, a convenience sample was chosen. The response rate of 33.8% caused a small sample size and the validity of results must be seen with caution. The study is therefore exploratory. Also, the questionnaire was tested for usability but was non-validated prior to this exploratory study. A clear recommendation to document the type of care needed and when to fill in the questionnaire after birth was not given. The pandemic may also have influenced the decision to enter professional care overall and may indirectly influence the subjective diagnosis of labour onset due to admission restrictions in Germany.

Moreover, BMI was calculated based on women’s recorded data. No specific instruction was given to record pre-pregnancy or in-pregnancy

body weight which may have altered BMI calculations. Comparing demographics with the current report of out-of-hospital births in Germany [31] it shows that in our sample obesity (BMI >30) was overrepresented. Furthermore, obesity was not marked as an influential factor on labour onset. The interpretation of these results can only show possible tendencies. Although the external validity of the study is low, it gives valuable insight into this under-researched area of intrapartum care and experience.

Conclusion

This study suggests primiparas tend to self-diagnose the onset of labour up to four days prior, and with a wider range of symptoms than typically acknowledged in standard clinical practice guidelines. This potentially leaves women in a state of uncertainty and may result in a lack of attention and care during this transitional phase between self-diagnosis and clinical confirmation of labour onset.

To provide woman-centred care, it is crucial to implement practices that involve the continuous support of a midwife at the location chosen by the woman, where she feels most comfortable. Additionally, it is important to reconsider current practice guidelines and definitions to better align them with women’s personal experiences. To gain a deeper understanding of the transition into early labour, it would be beneficial to conduct further prospective cohort studies with a larger and more diverse sample of primiparas. This will contribute to expanding our knowledge and insights in this emerging phase during childbirth.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.srhc.2023.100895>.

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