

# Investigation on the status of oral intake management measures during labor in China

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## Abstract

The World Health Organization recommended that the oral intake of low-risk pregnant women during labor should not be restricted. Hospitals in different countries take different measures to manage the intake during labor, but it is not clear about the current situation of oral intake management measures in the hospital during labor in China. Thus, the objective of this study was to investigate the current situation of oral intake management measures during labor in China, so as not only provide references for developing appropriate midwifery technology training and formulating relevant policies, but also provide a basis for exploring and implementing better oral intake management measures in the future.

A cross-sectional survey was conducted. From December 2017 to November 2018, the oral intake management measures of 1213 hospitals in 22 provinces, cities, and autonomous regions in China were investigated by a self-designed questionnaire.  $\chi^2$  test was used for statistical analysis.

Different hospitals in China have adopted different oral intake management measures. Among the 1213 hospitals, 939(77.4%) hospitals took measures to allow pregnant women to bring the easily digestible food, 813(67.0%) hospitals took measures to allow pregnant women to eat what she wanted to eat. Few hospitals provide pregnant women with oral nutrition solution or provide a suitable diet for pregnant women. Thirty-four (2.8%) hospitals still restrict pregnant women's fluid intake.

Oral intake management measures that are more suitable for Chinese pregnant women should be explored to better ensure the women energy needs and they safely go through childbirth.

**Abbreviations:** ACNM = American College of Nursing Midwives, IP Address = Internet Protocol Address, WHO = World Health Organization.

**Keywords:** oral intake, food, labor, China

## 1. Introduction

Natural childbirth is a process that requires huge amounts of energy; pregnancy can also lead to a higher basal metabolic rate, so oral intake management measures in this process have been the focus of researches.<sup>[1-4]</sup> If the pregnant women do not get enough energy intake during the labor process, it may lead to lower blood sugar, which will accelerate the decomposition of fat and increase

the production of ketone bodies.<sup>[5-7]</sup> At the same time, prolonged labor due to lack of energy may be related to the cesarean section, chorioamnionitis, postpartum hemorrhage, and adverse neonatal outcomes.<sup>[8-10]</sup> The World Health Organization (WHO) suggested that timely energy and fluid supplementation during vaginal delivery is one of the technical measures to reduce the cesarean section.<sup>[11]</sup> In the past, it was believed that pregnant women who gave birth naturally may be transferred to cesarean section at any time. To prevent pregnant women from anesthesia accidents during labor, the measures of limit eating and drinking during the labor process were adopted.<sup>[11]</sup> However, with the development of anesthesia technology, some researchers believed that feeding during surgery would not cause maternal death due to aspiration during surgery, and it should not be routinely implemented for pregnant women to limit eating and drinking.<sup>[12-14]</sup> Studies by Simkin et al and Armstrong et al show that women were afraid of being limited eating and drinking but want to eat during labor.<sup>[15,16]</sup>

Different countries have different oral intake management measures. According to an international survey conducted by the American College of Nursing Midwives (ACNM), hospitals in the United States often only allow pregnant women to eat clear liquid in the incubation period, gave water or ice in the active period, and only <10% of hospitals allowed them to eat in the flatbed period, but not in the active period. Ninety-six percent of the departments of obstetric medical institutions in the England allowed eating, of which 32.8% do not limit eating and drinking. In the Netherlands, 73% of Obstetricians and 67% of midwives let their mothers decide whether to eat or not.<sup>[17,18]</sup> In China, there are few studies on the oral intake management measures,

Editor: Daryle Wane.

The authors have no conflicts of interest to disclose.

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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How to cite this article: Huang CY, Luo BR, Hu J. Investigation on the status of oral intake management measures during labor in China. *Medicine* 2020;99:23 (e20626).

Received: 1 February 2020 / Received in final form: 30 April 2020 / Accepted: 8 May 2020

<http://dx.doi.org/10.1097/MD.00000000000020626>

and there is no research report on the actual implementation of the oral intake management during the labor process in Chinese hospitals. This study intends to investigate the specific situation of Chinese hospitals' implementation of oral intake management measures during the labor process, to provide a basis for better management of oral intake during labor, and to promote appropriate technologies for midwifery.

## 2. Materials and methods

### 2.1. Participants

This cross-sectional study was conducted from December 2017 to November 2018. We used stratified sampling and convenient sampling to select hospitals from 22 provinces, municipalities, and autonomous regions in China; a total of 1254 midwifery medical institutions conducted a questionnaire survey. All hospitals had joined the China Maternal and Child Health Association Midwifery Branch.

### 2.2. Data collection

The questionnaire was designed by ourselves. Through consulted relevant books and literature, and revised by 5 experts from the China Maternal and Child Health Association Midwifery Branch, we formed the questionnaire of "Questionnaire on the use of oral intake management measures" (Table 1). The 5 experts had worked in the obstetrics department or delivery room for >20 years. The questionnaire included 2 parts: the basic information of the hospital, the specific implementation of the oral intake management measures. The Cronbach  $\alpha$  coefficient of the questionnaire was 0.822.

The questionnaire survey was conducted on the Internet platform. Before the survey, the main person in charge of this subject trained the investigators in filling in the questionnaire, matters needing attention in reviewing, quality inspection of the questionnaire, and so on. The trained investigator sent the questionnaire via email or WeChat to the head nurse of obstetrics or delivery room of each medical institution, and answered the questions related to the questionnaire by phone and email. The same investigator reviewed the questionnaire. To ensure the

authenticity of the data, each IP address set in the background of the questionnaire can only submit the questionnaire once, and the questionnaire with obvious logical errors would be eliminated. Finally, 1254 questionnaires were sent out, and 1213 effective questionnaires were recovered. The effective recovery rate was 96.73%.

The study was approved by the Ethics Committee of West China Second University Hospital, Sichuan University. Informed consent was obtained from all participants.

### 2.3. Statistical analysis

SPSS 23.0 was used to analyze the data (SPSS Inc, Chicago, IL). The use cases and percentages of counting data were described, and the  $\chi^2$  test was used to compare the data among groups. The difference was statistically significant ( $P < .05$ ).

## 3. Results

A total of 1213 hospitals had been investigated, and were classified into general hospitals and specialist hospitals according to the hospitals' type, third-grade hospitals, and second-grade hospitals according to the hospitals' level (Table 2).

### 3.1. Overall situation of oral intake management measures

Among the 1213 hospitals, 939 hospitals (77.4%) allowed pregnant women to bring the easily digestible food, 813 hospitals (67.0%) allowed pregnant women to eat as they want, 745 hospitals (61.4%) allowed pregnant women to drink sports drinks, 744 hospitals (61.3%) allowed pregnant women to eat chocolate and 108 hospitals (8.9%) allowed pregnant women eating boiled eggs. There were only 98 hospitals (8.1%) that provided suitable diets for each pregnant woman and 73 hospitals (6.0%) who had self-administered oral nutrient solution. Thirty-four hospitals (2.8%) adopted the measure to not allow the pregnant women to drink, and 109 hospitals (9.0%) didn't allow pregnant women to eat solid food. There are 12 hospitals (1.0%) that adopt other oral intake management measures not mentioned above (Table 3).

**Table 1**  
Questionnaire on the use of oral intake management measures.

Question	Answer
First part: The basic information of the hospital	
1. What level of hospital is your hospital?(Single choice questions)	A. Third-grade hospital B. Second-grade hospital
2. What type of hospital is your hospital?(Single choice questions)	A. General hospital B. Specialized hospital
Second part: The specific implementation of the oral intake management measures	
1. Which of the following measures does your hospital take in the process of labor? (Multiple choice questions)	A. Easily digestible food carried by the pregnant women B. Pregnant women eat as they want C. Sports drink D. Chocolate E. Solid food fasting F. Boiled eggs G. Hospital provides suitable diet for the pregnant women H. Preparation of oral nutrient solution by the hospital I. Liquid fasting J. Other measures (please write this)

**Table 2**  
The number of hospitals surveyed.

Variables	Type		Level	
	General hospital n (%)	Specialized hospital n (%)	Third-grade hospital n (%)	Second-grade hospital n (%)
Numbers	960 (79.1)	253 (20.9)	672 (55.4)	541 (44.6)
Total	1213			

**3.2. Oral intake management measures in different types of hospitals**

In the 3 measures that is drinking sports drinks, hospitals provide a suitable diet for the pregnant women and preparation of oral nutrient solution by the hospital, the number of specialized hospitals is more than that of general hospitals, and the difference is statistically significant. These 2 types of hospitals have no significant differences in the other oral intake management measures (Table 4).

**3.3. Oral intake management measures in different levels of hospitals**

In the 2 measures that is drinking sports drinks and preparation of oral nutrient solution by the hospital, the number of the third-grade hospital is more than that of the second-grade hospital. However, in the 2 measures that is eating chocolate and pregnant women eat as they want, the number of the second-grade hospitals is more than that of the third-grade hospital. No significant difference was found between third-grade hospital and second-grade hospital in the other oral intake management measures (Table 5).

**4. Discussion**

In this study, we surveyed 1213 hospitals' oral intake management measures in the process of labor in China. A total of 77.4% of the hospitals' oral intake management measures adopted were to allow pregnant women to bring the easily digestible food, such as bread and oatmeal. Scutton et al compared pregnant women who ate a light diet and those who ate only water during labor, and found no difference in the duration of the labor and the postnatal outcome of the mother and child, but pregnant women who took a light diet had a lower incidence of ketosis.<sup>16</sup> However, when taking these management measures, doctors or

**Table 3**  
Oral intake management measures during labor.

Variables	No. of hospitals (n = 1213)
Easily digestible food carried by the pregnant women	939 (77.4)
Pregnant women eat as they want	813 (67.0)
Sports drink	745 (61.4)
Chocolate	744 (61.3)
Solid food fasting	109 (9.0)
Boiled eggs	108 (8.9)
Hospital provides suitable diet for the pregnant women	98 (8.1)
Preparation of oral nutrient solution by the hospital	73 (6.0)
Liquid fasting	34 (2.8)
Other measures	12 (1.0)

midwives need to do adequate health education for pregnant women before giving birth so that pregnant women can accurately understand what is easily digestible food.

Sixty-seven percent of the hospitals took measures to manage the food intake that pregnant women can eat as they want, with secondary hospitals being the most common. This shows that these hospitals took a very open attitude in the oral intake management of labor during the delivery process. Pregnant women can choose the diet provided by the hospital or bring their own diet. The study of O Sullivan et al<sup>119</sup> showed that pregnant women who ate according to their own wishes are not different from pregnant women who take oral water in terms of the duration of labor and the incidence of vomiting. The study of Tranmer et al<sup>120</sup> also showed that the incidence of postpartum dystocia among pregnant women who ate according to their own wishes is not different from that of women who only take ice or water, which explain that the pregnant woman is safe to eat as she wants.

A total of 61.4% of hospitals supported pregnant women' consumption of sports drinks during labor. Sports medical scientists believed that the process of childbirth is similar to the process of athletes strenuous exercise, and sports drinks contain a lot of energy.<sup>121</sup> In 2002, a study conducted by Kubli et al allowed pregnant women to drink sports drinks early in the delivery process, and found that although sports drinks did not reduce the time of delivery and the incidence of vomiting, but could reduce the amount of ketones produced by pregnant women.<sup>151</sup>

A total of 61.3% of hospitals allow pregnant women to eat chocolate. Chocolate contains a lot of high-quality carbohydrates, the main ingredients are sucrose, cocoa butter, protein,

**Table 4**  
Oral intake management measures in different types of hospitals.

Variables	General hospital (n=960) n (%)	Specialized Hospital (n=253) n (%)	$\chi^2$	P
Easily digestible food carried by the pregnant women	741 (77.2)	198 (78.3)	0.132	.72
Pregnant women eat as they want	656 (68.3)	157 (62.1)	3.571	.06
Sports drink	572 (59.6)	173 (68.4)	6.538	.01
Chocolate	598 (62.3)	146 (57.7)	1.774	.18
Solid food fasting	80 (8.3)	29 (11.5)	2.397	.12
Boiled eggs	81 (8.4)	27 (10.7)	1.233	.27
Hospital provides suitable diet for the pregnant women	67 (7.0)	31 (12.3)	7.499	<.001
Preparation of oral nutrient solution by the hospital	50 (5.2)	23 (9.1)	5.337	.02
Liquid fasting	30 (3.1)	4 (1.6)	1.752	.19
Other measures	9 (0.9)	3 (1.2)	0.126	.72

**Table 5**  
**Oral intake management measures in different levels of hospitals.**

Variables	Third-grade hospital (n=672) n (%)	Second-grade hospital (n=541) n (%)	$\chi^2$	P
Easily digestible food carried by the pregnant women	527 (78.4)	412 (76.2)	0.881	.35
Pregnant women eat as they want	434 (64.6)	379 (70.1)	4.061	.04
Sports drink	434 (64.6)	311 (57.5)	6.371	.01
Chocolate	386 (57.4)	358 (66.2)	9.639	<.001
Solid food fasting	69 (10.3)	40 (7.4)	3.027	.08
Boiled eggs	53 (7.9)	55 (10.2)	1.920	.17
Hospital provides suitable diet for the pregnant women	63 (9.4)	35 (6.5)	3.407	.07
Preparation of oral nutrient solution by the hospital	57 (8.5)	16 (3.0)	16.174	<.001
Liquid fasting	18 (2.7)	16 (3.0)	0.086	.77
Other measures	7 (1.0)	5 (0.9)	0.042	.88

and so on. Chocolate digests and absorbs quickly, and can produce a lot of energy. In addition, chocolate also contains a small amount of caffeine. Caffeine has an exciting effect on the brain, which may stimulate the maternal spirit and relieve fatigue. It can also excite the heart and dilate blood vessels, ensure the fetal blood supply in the mother's body, and avoid fetal distress occur.<sup>[21]</sup> However, some studies showed that although carbohydrate intake does not change the speed and outcome of delivery during labor, it is also harmless.<sup>[22,23]</sup>

Nine percent of hospitals forbade pregnant women from eating solid food. Childbirth is a process in which the mother continuously consumes energy, supplementing solid food is beneficial and food intake should be increased.<sup>[2,3]</sup> However, some studies have shown that eating solid foods during labor can lead to prolonged labor, especially during the first labor.<sup>[24]</sup> The "2014 Chinese Anesthesiology Guide and Expert Consensus" states that during the period of labor, low-risk expectant mothers can eat liquid food without residues, but solid food is prohibited during the delivery process.<sup>[25]</sup> The reason is that after eating, the burden on the digestive tract will be increased, the blood flow will be concentrated in the digestive tract, resulting in a decrease in uterine blood flow and affecting the contraction of uterine muscle smooth muscle, which may lead to prolonged labor.<sup>[26]</sup> Hospitals that ban maternal food solids during labor may agree to this point more.

A total of 8.9% of hospitals adopted the measure of eating boiled eggs. An egg weighs about 50 g, contains 7 g of protein, 6 g of fat, and produces 82 kcal of heat.<sup>[27]</sup> The amino acid ratio of egg protein is very suitable for human physiological needs, and is easily absorbed by the body, with high nutritional value. However, if the egg is boiled in boiling water for >10 minutes, the internal protein structure becomes tighter, and it is not easy to contact protein digestive enzymes in gastric juice, which is not conducive to digestion to a certain extent.

The proportion of preparation of oral nutrient solution by hospital is 6.0%. According to the hospital level, more third-grade hospitals are adopting this measure than second-grade hospitals, which may be related to the fact that some second-grade hospitals do not have professionals who can prepare oral nutrition solutions. The taste of nutrient solution is not good, or the patient may think that the hospital is taking this opportunity to charge extra fees, which may result in fewer hospitals taking this measure of oral intake management. Xue et al found that the nutrition solution containing pure water, maltodextrin, casein, hawthorn, and vitamin C in the first and second stages of labor

could shorten the labor process and reduce the occurrence of fetal intrauterine hypoxia.<sup>[28]</sup>

The proportion of hospitals that provided a suitable diet for pregnant women is not high. As a professional who knows more about health and nutrition than the pregnant women, if the medical staff can provide appropriate diet according to the needs of the pregnant women, it can not only reduce the situation of the lack of energy of the pregnant women, but also avoid the occurrence of some adverse situations caused by the excessive food of the pregnant women. Hou et al<sup>[29]</sup> found that if the diet can be personalized for the mother, the duration of the labor can be reduced. However, this measure requires more effort and time from the staff. However, due to the general shortage of midwifery human resources in Chinese hospitals, it is difficult for the hospital to provide the most suitable diet for each patient. This measure has the highest proportion of implementation in specialized hospitals, which may be related to the richer human resources in specialized hospitals and the greater emphasis on the development of suitable technologies for midwifery.

In 1997, the WHO proposed that pregnant women should be given energy and water in time during labor.<sup>[1]</sup> However, according to the results of this study, 2.8% of hospitals still adopt measures to prevent drinking water or drinks. In 2013, Singata et al<sup>[30]</sup> conducted a meta-analysis and found that it was unnecessary to restrict the food and water consumption of low-risk pregnant women who might not need anesthesia during labor. Studies by Sleutel et al and O'Sullivan et al also suggest that fluid consumption is feasible and safe during labor, at least in women at low risk of complications.<sup>[19,31]</sup>

The limitation of this study is that there is no further reason for investigating why each hospital has adopted this measure of oral intake management, which can be improved in future studies.

## 5. Conclusion

In China's hospitals, the measures taken the most are the easily digestible food carried by pregnant women and allow pregnant women to eat as they wish. Few hospitals provide oral nutrition solutions for pregnant women or provide a suitable diet for pregnant women according to the situation of pregnant women. There is a great difference between Chinese hospitals in the management of oral intake, so we should explore more suitable oral intake management measures for Chinese women, so as to better ensure the demand for energy and the safe passage of childbirth.

## Acknowledgments

The authors are grateful to the midwifery director of each province/city/autonomous region and the head nurse of the delivery room/obstetric department who participated in this survey.

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