

The “zuòyuèzi” Practices During Puerperium and Its Association with Health Status Among Postpartum Women in Southern China: A Cross Sectional Study

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Abstract

Background: Maternal health problems during postpartum period are highly prevalent worldwide, which may be related to unhealthy dietary and behavioral practices of postpartum women. Accordingly, this study aimed to explore postpartum dietary and behavioral practices, and their relationship with maternal health in Guangzhou, China.

Methods: We conducted a cross-sectional study among postpartum women in urban and suburban area in Guangzhou China. Data about postpartum dietary and behavioral practices and health conditions were collected by a standardized questionnaire. Logistic regression analysis was used to identify the factors related to women's health.

Results: A total of 2040 women were recruited, 2013 of which complete the questionnaire, including 1007 from urban area and 1006 from suburban area. The consumption of animal food was triple the recommended intake, while the intakes of fruits, milk and seafood were deficient; and most women were lack of physical activities. 75.5% of women reported at least one postpartum disease, and the most common problems were prolonged uterine bleeding (70.0%) and backache (43.0%), followed by constipation (23.6%), insufficient milk secretion (19.2%), breast swelling (18.5%) and hemorrhoids (13.8%). *Median* of postpartum body weight retention was 3.5 kg. Logistic regression analysis revealed that 12-18 h/d of bed rest time, breastfeeding, doing postpartum exercise, basking, getting out of bed within 2 days after delivery, intake of animal food (250-350 g/d), vegetables (>500 g/d), grain and potato (250-450 g/d) were protective factors for at least one out of these health problems or weight retention ($P<0.05$). Bed rest time for more than 18 h/d or less than 12 h/d, ginger vinegar intake, doing housework, cesarean section, and excessive intake of grain and potato (>450 g/d) had adverse association ($P<0.05$).

Conclusion: Postpartum low physical activity and adherence to the diet with high intake of animal food and inadequate intake of fruits, vegetables and milk were very common in Guangzhou. Further studies are needed to assess whether postpartum diet and behavioral intervention improve maternal health during postpartum period.

Background

Postpartum period is a critical transitional time for the mother, her newborn, and the family, which begins with childbirth to reproductive organs returning to their normal non-pregnant state, and covers 6 weeks[1]. In China, the first month after childbirth is called “zuòyuèzi”, also known as “sitting with the month” or “doing the month”. Some newborn and maternal health problems such as bleeding, venous thromboembolism, pain, breast problems, depression, infection, postpartum weight retention and malnutrition are caused by the inappropriate care during the postpartum period [1–3]. Previous study illustrated that at least one such problem was reported by about 60% of women in China [3].

The American College of Obstetricians Gynecologists suggested that postpartum care should be an ongoing process, with services and support tailored to each woman's needs [4]. However, in western

countries, women have noted that there is an intense focus on women's health prenatally but care during the postpartum period is infrequent and late [5]. "Zuòyuèzi", as a postpartum tradition with the woman and her newborn surrounded and supported by family and community members, has a history for more than 2000 years in China [6, 7]. Women usually follow traditional customs or taboos, which is characterized by the room confinement, the avoidance of shampoo and bath, as well as the changes in diet (encouraging warm or yang food, such as animal food and limiting cold or yin food, such as vegetables and fruits) during this period [8, 9]. Even enormous development has been achieved in China, most postpartum women still follow these kinds of traditional customs [10]. Those practices are believed to promote healing of wounds, prevent long-term diseases and increase lactation in traditional view. But some researchers disputed controversial claims of adherence to the "zuòyuèzi" practices, which may be due to the complexity of the whole ritual. Some studies indicated that traditional health care practices were beneficial to postpartum women, since the women will receive more care, support and reassurance from family and friends during this period [11–13]. While others believed that monotonous diet, avoiding vegetables and fruits, will easily lead to malnutrition. Excessive intake of protein and carbohydrates and inadequate intake of calcium and vitamin C may have relations with weight retention, venous thromboembolism and postpartum complications [3, 14]. Additionally, activity restriction, particularly the long period of bed rest, commonly causes cardiovascular and musculoskeletal deconditioning, and leads to reduced aerobic endurance and lower-body muscle strength [14, 15]. Thus, the validity association of traditional diet and behavioral practices with maternal health still remains a far reached question.

Despite the complexity and common use of "zuòyuèzi" among China, only a limited number of studies with limited sample size (< 400) in north china (Wuhan, Shanghai and Beijing) have been performed to quantitatively assess the association between women's health and "zuòyuèzi" practices of women during this period [6, 15–17]. Beyond that, postpartum diet, behavioral practice and other domestic traditions and obligations vary greatly among different countries and regions [18–20]. Thus, it is important to explore the information about health status and special customs in diet and behavioral practice during postpartum period in southern China for the first time, and to figure out the factors related to health status in southern China.

The objectives of this study were: (1) to collect the data of diet and behavioral practices Guangzhou, China; (2) and to examine the association between postpartum practices and health status and identify which factors were related to health status.

Methods

Study population

A cross-sectional retrospective survey from May 2009 to November 2009 was conducted in two districts of Guangzhou, including Yuexiu District as urban area and Baiyun District as suburban area. This study included those women with singleton pregnancy, who delivered a healthy baby, at 42 days to 1 year postpartum, and were eligible for midwifery care in Maternal and Child Health Hospital in two districts.

Those were excluded if they were younger than 17 years old, suffered from gestational complications (e.g. gestational diabetes, pregnancy with heart disease, etc) during pregnancy or delivered an unhealthy baby. A total of 2040 women were recruited, 2013 of which complete the questionnaire, including 1007 from urban area and 1006 from suburban area.

Dietary assessment

The information of specific food consumed regularly (such as ginger vinegar, brown sugar, etc) during postpartum period was collected by face-to-faced questionnaire. The short food frequency questionnaire (FFQ) composed of 19 items was used to collect the information of food intake, by asking the participants to recall the frequency and approximate amount of food consumed during the period of “zuòyuèzi”. The categories of foods included cereals (e.g., rice, noodle, coarse grain, etc.), tuber (e.g., sweet potato, Chinese yam, taro, potato, etc.), eggs, dairy (e.g., milk, dried milk, yoghurt, etc.), red meat (e.g., pork, beef, mutton, etc.), fishes, poultry (e.g., chicken, duck, goose, etc.), shrimps and crabs, visceral of animal, blood of animal, soy, soy-based products (soybean milk, tofu curd, tofu, dried pieces of bean curd, etc.), green leafy vegetables and other vegetables (e.g., eggplant, wax gourd, etc.), fruits, seed (sunflower, pumpkin) or nut (walnut, hazelnut, etc.), brown sugar and beverages. Measures (such as cups, bowls and spoons) and photos of food were used to assist food recall and measurement. The total consumption for each type of food was calculated and converted to mean daily intake.

Lifestyle investigation

This face-to-faced questionnaire also collected detailed information about frequency of behavioral practices in four degrees (never, occasionally, every week, every day) during the period of “zuòyuèzi”, including bedroom ventilation, doing postpartum exercise, doing housework, outdoor sunbath and personal hygiene, and hours of sleep and bed rest.

Physical health status

The information about women’s health status during postpartum period included self-reported body weight from pre-pregnancy to postpartum, lactation, blood lochia duration and the incidence of various postpartum diseases including backache, constipation, breast swelling, hemorrhoids, leg cramps, dizziness were collected by the face-to-faced interview. In this study, “sufficient lactation” was defined as exclusive breastfeeding within 6 weeks along with normal growth and development of infant; and “moderate lactation” was simply defined as breastfeeding cannot meet the physical needs of infants, but the added dairy products did not exceed half of the baby physiological needs; that the women secreted little breast milk and the infant feeding mainly depended on dairy products was considered as “insufficient lactation”; “none” was milk free secretion, all of which were artificially fed. Lochia was divided into bloody lochia, serous lochia and white lochia, which lasted about 3 ~ 4 days, 10 days and 3 weeks, respectively. The prolonged uterine bleeding was defined as bloody lochia lasting for more than 14 days [21]. And postpartum weight retention was calculated as current self-reported body weight minus pre-pregnancy body weight.

This questionnaire survey was conducted by face-to-face interview. And all interviewers were health professionals from maternal and child health clinic, and trained uniformly before investigation.

Statistical analysis

The operation about data input was carried out by two people performed in Epidata 3.1, then data and logicality were checked, and the unqualified data were corrected. Data analysis was performed using IBM SPSS 23.0. Normality for continuous data was tested before analysis. Women's characteristics and food intake were expressed as mean and standard deviation (SD) or median (P_{25} , P_{75}) for continuous variables, and absolute and relative frequencies for categorical variables. Student t test, nonparametric test and χ^2 tests were used to compare the characteristics, food intake and prevalence of health problems between women residence in urban and suburban area.

A series of multivariate logistic regression analyses (Forward:LD) were performed to estimate the effects of food consumption, health behaviour and other factors on the maternal morbidity. The variables that showed difference between case and control at the $P < 0.10$ level in the univariate analysis, were identified as independent variables and input into the logistic regression analysis. Then those variables, which had significant relationship with response variables at $P < 0.05$ level were considered as independent variables in the final regression models, and the odds ratio (OR) corresponding with 95% confidence interval (CI) was computed. The following variables were considered as potential independent variables: place of residence (0 = urban resident, 1 = suburban resident), parity (0 = primipara, 1 = multipara), way of delivery (0 = vaginal delivery, 1 = cesarean), started to work during postpartum period (0 = no, 1 = yes), education level (continuous), annual household income (continuous), age (continuous), pre-pregnancy BMI (continuous), gestational weight gain (continuous), anemia during pregnancy (0 = no, 1 = yes), had leg cramps during pregnancy (0 = no, 1 = yes), time interval between the date of investigation and delivery (continuous), cereal intake (0 = less than 250 g/d, 1 = 250–450 g/d, 2 = more than 450 g/d), animal food intake (0 = less than 250 g/d, 1 = 250–350 g/d, 2 = more than 350 g/d), vegetables intake (0 = less than 350 g/d, 1 = 350–500 g/d, 2 = more than 500 g/d), fruits intake (0 = 0 g/d, 1 = 1–400 g/d, 2 = more than 400 g/d), soy and soy-based products intake (0 = 0 g/d, 1 = 1–25 g/d, 2 = more than 25 g/d), seed and nut intake (0 = 0 g/d, 1 = 1–12 g/d, 2 = more than 12 g/d), milk (0 = 0 g/d, 1 = 1–300 g/d, 2 = 300–500 g/d, 3 = more than 500 g/d), ginger vinegar intake (0 = no, 1 = yes), brown sugar intake (0 = no, 1 = yes), basking (0 = never, 1 = occasionally, 2 = every week/day), doing postpartum excise (0 = never, 1 = occasionally, 2 = every week/day), shampoo (0 = never, 1 = occasionally, 2 = every week/day), shower (0 = never, 1 = occasionally, 2 = every week/day), tooth brushing (0 = never, 1 = occasionally, 2 = every week/day), lower body washing (0 = never, 1 = occasionally, 2 = every week/day), bedroom ventilation (0 = never, 1 = occasionally, 2 = every week/day), doing house work (0 = never, 1 = occasionally, 2 = every week/day), bed rest time for less than 12 h/d (0 = no, 1 = yes), bed rest for more than 12 h/d and less than 18 h/d (0 = no, 1 = yes), bed rest time for more than 18 h/d (0 = no, 1 = yes), mean sleep duration (0 = less than 8 h/d, 1 = more than 8 h/d), breastfeeding (0 = no, 1 = yes), breast feeding started within 0.5 h after giving birth (0 = no, 1 = yes), and getting out of bed within 2 days after delivery (0 = no, 1 = yes). The response variables were prolonged uterine bleeding (0 = blood lochia duration \leq 14 days, 1 = blood lochia duration $>$ 14 days),

backache (0 = no, 1 = yes), insufficient milk secretion, (0 = “sufficient” and “moderate”, 1 = “lack” and “none”), and diseases, such as constipation (0 = no, 1 = yes), breast swelling (0 = no, 1 = yes), hemorrhoids (0 = no, 1 = yes), leg cramps (0 = no, 1 = yes) and dizziness (0 = no, 1 = yes). A logistic regression model (Forward:LD) was performed, and the median of body postpartum weight retention (PPWR) was set as the boundary value (1 = PPWR > *Median*; 0 = PPWR ≤ *Median*), to assess the relationship between postpartum weight retention and key variables, which showed differences at the $P < 0.10$ level in univariate analysis. The significant level for inclusion of a variable was 0.05, and 0.1 for exclusion of a variable.

Results

Characteristics of the participants

The mean age of participants was 27.81 ± 4.04 years old. Urban participants were elder, and had higher education level and annual household income. Nearly 90% of participants were primiparas (86.0%), accounting for 93.9% and 78.1% in urban and suburban areas, respectively. About 60% of women were for vaginal delivery (Table 1).

Table 1
characteristics of the participants

	Urban		Suburban		Totals	
	n	%	n	%	n	%
Age (years)						
< 25	111	11.1	312	31.4	423	21.2
25 ~ 30	586	58.5	534	53.7	1120	56.1
> 30	305	30.4	129	15.0	454	22.7
Education						
Primary school	13	1.3	42	4.2	55	2.7
Middle school	112	11.2	410	40.8	522	26.0
High school	262	26.1	347	34.6	609	30.3
Junior college / Vocational College	300	29.9	155	15.4	455	22.7
College and above	317	31.6	50	5.0	367	18.3
Annual household income (yuan)						
< 10 k	127	12.9	137	13.9	264	13.4
10 ~ 40 k	257	26.1	520	52.7	777	39.4
40 ~ 100 k	410	41.7	281	28.5	691	35.1
> 100 k	190	19.3	48	4.9	238	12.1
Mode of delivery						
Vaginal delivery	523	51.9	688	68.4	1211	60.1
Cesarean section	484	48.1	318	31.6	802	39.8
Parity						
Primipara	946	93.9	786	78.1	1732	86.0
Multipara	61	6.1	220	21.9	281	14.0

Dietary information

Maternal dietary intakes during postpartum period are presented in Table 2. The consumption of food during postpartum period was compared with the dietary guidelines for Chinese lactating women[22]. The average consumption of total fish, poultry, eggs and red meat was nearly triple the recommendation

defined as 250 g/day during postpartum period, especially in suburban area ($p < 0.05$). But the mean consumption of total grain and potato was close to the lower limit of recommendation. And there was about half of the recommended consumption of vegetables, soybeans and soybean products, and less than half of the recommended intake of dairy and fruits among participants during postpartum period. Suburban participants had higher poultry and eggs intake compared to urban participants ($p < 0.05$), while the consumption of dairy, soybeans and soybean products, green leafy vegetables and fruits among urban participants was significantly higher than suburban participants ($p < 0.05$).

Daily consumption of animal food was over 300 g in 83.8% of women during postpartum period. But most women never consumed soybean and soybean products, nuts, accounting for 62.8%, and 75.8%, respectively; some women never consumed milk and fruits, accounting for 40.0% and 30.3%, respectively; 40.0% of women consumed less than 200 g of vegetables, and 5.2% never consumed vegetables (Fig. 1). In addition, 63.1% of the women consumed ginger vinegar soup regularly.

Table 2
Intake of food during postpartum period P50 (P25 ~ P75, g/d)

Food	Urban	Suburban	Total	DG	<i>P</i>
Grain and potato	303.5(225.0, 450.0)	300.0(225.0, 450.0)	300.0(225.0, 450.0)	300 ~ 350	0.189
Fish	100.0(36.0, 200.0)	88.5(29.0, 150.0)	100.0(30.0, 180.0)	75 ~ 100-	0.124
Poultry	100.0(43.0, 200.0)	153.5(86.0, 300.0)	143.0(57.0, 300.0)	75 ~ 100	< 0.001*
Red meat	200(100.0, 300.0)	160(100.0, 300.0)	177.5(100.0, 300.0)		0.028*
Eggs	80.0(50.0, 120.0)	145.0(60.0, 260.0)	100.0(50.0, 200.0)	50	< 0.001*
Total fish, poultry, red meat and eggs	517.0(335.0, 850.0)	664.0(460.8, 958.5)	605.0(600.0, 900.0)	200 ~ 250	< 0.001*
Soybeans and soybean products	0(0, 43.0)	10(0, 18.0)	0(0, 29.0)	25	< 0.001*
Green leaf vegetables	200.0(107.0, 400.0)	150.0(50.0, 300.0)	200.0(100.0, 300.0)	400 ~ 500	< 0.001*
Other vegetables	0(0, 64.0)	14.0(0, 64.0)	5.0(0, 64.0)		0.051
Fruits	50.0(0, 150)	29.5(0, 120.0)	43.0(0, 150)	200 ~ 400	0.004*
Dairy	200.0(14.0, 250)	0(0, 150.0)	57.0(0, 250)	300 ~ 500	< .000*
Nuts	0(0, 3.0)	0(0, 0)	0(0, 0)	10	< 0.001*
Crab/Shrimp	0(0, 0)	0(0, 0)	0(0, 0)		< 0.001*
Brown sugar	0(0, 10)	0(0, 10)	0(0, 6)		< 0.001*

* $p < 0.05$, *P* was derived from nonparametric test across two groups; DG: recommended food intake according to the Dietary Guidelines for Chinese lactating women.

Behavioral practices

The average daily sleep time of women during postpartum period was 9.04 ± 2.13 h, and the bed rest time was 13.39 ± 3.40 h. More than 90% of the women rarely or never did postpartum exercises (91.7%). Almost all women (99.2%) ventilated, 64.6% got out of bed within 2 days after delivery, 15.2% never basked, and 58.3% pay slightly more attention to keeping warm than usual; the detailed information of behavioral practice is shown in Table 3.

The prevalence of not bathing (4.4%), not washing feet (1.6%), not brushing teeth (1.0%) and not washing low private part (0.1%) was low among women. But the behavior of never shampoo (14%) had a high incidence (the data were not shown).

Table 3
behavior practice during postpartum period

	Urban		Suburban		Total		<i>P</i>
	n	%	n	%	n	%	
Infant feeding patter within 4 months							
Breastfeeding	331	32.9	513	51.0	844	42.0	< 0.001*
Mixed feeding	331	59.9	411	40.9	1013	50.4	
Artificial feeding	72	7.7	81	8.1	153	7.6	
Time of bed rest							
< 12 h	416	41.3	490	48.7	906	45.0	< 0.001*
12–18 h	376	37.3	369	36.7	745	37.0	
> 18 h	215	21.4	147	14.6	362	18.0	
Bedroom ventilation							
No	7	0.7	9	0.9	16	0.8	0.628
Yes	1000	99.3	997	99.1	1997	99.2	
Get out of bed within two days							
No	400	39.7	312	31.0	712	35.4	< 0.001*
Yes	607	60.3	694	69.0	1301	64.6	
Sleeping time							
> 8 h	571	56.7	513	51.0	1084	53.8	0.011*
< 8 h	436	43.3	493	49.0	929	46.2	
Postpartum exercise							
Per day/week	100	9.9	68	6.8	168	8.3	0.010*
Never/less	907	90.1	938	93.2	1845	91.7	
Housework							
Often	255	25.3	213	21.2	468	23.2	0.007*
Sometimes	457	45.4	526	52.3	983	48.8	
Never	295	29.3	267	26.5	562	27.9	
Basking							

	Urban		Suburban		Total		
Often	472	46.9	431	42.8	903	44.9	< 0.001*
Sometimes	361	36.8	443	44.0	804	39.9	
Never	174	17.3	132	13.1	306	15.2	
Warmth keeping							
As usual	359	35.7	443	44.0	802	39.8	< 0.001*
Slightly more	631	62.7	542	53.9	1173	58.3	
Far more	17	1.7	21	2.1	38	1.9	

Maternal health problems during postpartum period

75.5% of the postpartum women reported one or more puerperal diseases. Table 4 shows the incidence of health problems reported during postpartum period. The most common problem was prolonged uterine bleeding (70.3%), backache (43.0%), followed by constipation (23.6%), insufficient milk secretion (19.2%), breast swelling (18.5%) and hemorrhoids (13.8%). And the *Median* ($P_{25} \sim P_{75}$) of postpartum weight retention was 3.5 (1.0 ~ 6.3) kg.

Table 4
Prevalence of health problem during postpartum period

	Urban		Suburban		Total		<i>P</i>
	n	%	n	%	n	%	
Prolonged Uterine Bleeding	810	80.4%	606	60.2	141	70.3	< 0.001*
Backache	487	48.4	378	37.6	865	43.0	< 0.001*
Constipation	201	20.0	274	27.2	475	23.6	< 0.001*
Insufficient milk secretion	225	22.3	161	16.0	386	19.2	< 0.001*
Breast swelling	196	19.5	176	17.5	372	18.5	0.255
Hemorrhoid	127	12.6	151	15.0	278	13.8	0.119
Leg cramps	101	10.0	133	13.2	234	11.6	0.026*
Dizziness	83	8.2	146	14.5	229	11.4	< 0.001*

Factors associated with postpartum health problem

The logistic regression analysis showed that basking was associated with less backache, breast swelling, hemorrhoids, and insufficient milk secretion. Doing postpartum exercise was likely to decrease the risk of prolonged uterine bleeding and postpartum weight retention. Women residence in suburban area reported fewer occurrences of prolonged uterine bleeding and insufficient milk secretion, and more occurrences of constipation and dizziness. Bed rest time for 12–18 h/d was a protective factor for backache and breast swelling, and bed rest time for less than 12 h/d was a risk factor for prolonged uterine bleeding and insufficient milk secretion. Doing housework and cesarean birth were related with high risk of backache. Breastfeeding within 4 months resulted in less backache and constipation. Moderate intake of animal food (250–350 g/d) and high intake of vegetables (> 500 g/d) had protective effects on the prolonged uterine bleeding, whereas ginger vinegar intake and excessive intake of total grain and potato (> 450 g/d) had an adverse association with breast swelling and leg cramps. The detailed data are listed in Table 5 to 7.

Table 5
Logistic regression analysis of factors influencing puerperium health problems

Factors		<i>P</i>	<i>OR</i>	95% <i>CI</i> for <i>OR</i>	
				Lower	Upper
Prolong uterine bleeding					
Doing postpartum excise	Never		1		
	Every day/week	0.024	0.665	0.467	0.948
Time of bed rest (> 18 h/d)	No		1		
	Yes	< 0.001	2.133	1.555	2.925
Time of bed rest (< 12 h/d)	No		1		
	Yes	< 0.001	1.501	1.199	1.879
Place of residence	Urban resident		1		
	Suburban resident	< 0.001	0.330	0.264	0.413
Intake of animal food	< 250 g/d		1		
	250–350 g/d	0.047	0.630	0.399	0.993
Intake of ginger vinegar	No		1		
	Yes	< 0.001	1.873	1.510	2.324
Intake of vegetables	< 250 g/d		1		
	> 500 g/d	0.004	0.673	0.513	0.884
Breast swelling					
Basking	Never		1		
	occasionally	0.003	0.606	0.435	0.843
	Everyday/week	0.004	0.618	0.446	0.856
Time of bed rest (12–18 h/d)		0.007	0.723	0.572	0.914
Intake of grain and potato	< 250 g/d		1		
	> 450 g/d	0.011	1.459	1.090	1.955
Doing housework	Often	< 0.001	1.855	1.345	2.557
Insufficient milk secretion					
Place of residence	Urban resident		1		

Factors		<i>P</i>	<i>OR</i>	95% <i>CI</i> for <i>OR</i>	
				Lower	Upper
	Suburban resident	< 0.001	0.593	0.466	0.754
Basking	Never		1		
	Every day/week	0.017	0.665	0.475	0.931
Delivery way	Vaginal delivery		1		
	Caesarean birth	0.005	1.393	1.103	1.758
Time of bed rest (< 12 h/d)	No		1		
	Yes	< 0.001	1.601	1.270	2.019
Intake of ginger vinegar	No		1		
	Yes	0.014	1.360	1.063	1.739

Table 6
 Logistic regression analysis of factors influencing puerperium increase health problems

Factors		<i>P</i>	<i>OR</i>	95% <i>CI</i> for <i>OR</i>	
				Lower	Upper
Backache					
Breastfeeding	No		1		
	Yes	0.013	0.768	0.624	0.945
Basking	Never		1		
	Everyday/week	0.034	0.736	0.554	0.978
Doing housework	No		1		
	Yes	< 0.001	1.280	1.120	1.464
Time of bed rest (12–18 h/d)	No		1		
	Yes	< 0.001	0.666	0.550	0.807
Delivery way	Vaginal delivery		1		
	Caesarean birth	< 0.001	1.413	1.169	1.708
Hemorrhoids					
Basking	Never		1		
	Every day/week	0.028	0.820	0.687	0.979
With constipation	No		1		
	Yes	< 0.001	1.881	1.431	2.472
Constipation					
Place of residence	Urban resident		1		
	Suburban resident	< 0.001	1.574	1.271	1.949
Breastfeeding	No		1		
	Yes	0.004	0.724	0.582	0.900
Leg cramps					
Intake of grain and potato	< 250 g/d		1		

Factors		<i>P</i>	<i>OR</i>	95% <i>CI</i> for <i>OR</i>	
				Lower	Upper
	> 450 g/d	0.039	1.507	1.020	2.225
Getting out of bed within 2 days after delivery	No		1		
	Yes	0.008	0.651	0.474	0.893
Leg cramps during pregnancy		< 0.001	2.134	1.556	2.927
Dizziness					
Getting out of bed within 2 days after delivery	No		1		
	Yes	0.032	0.730	0.546	0.974
Intake of grain and potato	< 250 g/d		1		
	250–450 g/d	< 0.001	0.508	0.360	0.717
	> 450 g/d	0.027	0.682	0.487	0.957
Place of residence	Urban resident		1		
	Suburban resident	0.001	1.741	1.256	2.413

Table 7
Logistic regression analysis of factors influencing postpartum weight retention

Factors		<i>P</i>	<i>OR</i>	95% <i>CI</i> for <i>OR</i>	
				Lower	Upper
Doing postpartum excise	Never		1		
	Every day/week	0.033	0.696	0.499	0.971
Pre-pregnancy BMI (kg/m ²)		< 0.001	0.885	0.851	0.921
Time interval between the data of investigation and delivery (months)		< 0.001	0.923	0.896	0.952
Delivery way	Vaginal delivery		1		
	Caesarean birth	0.003	1.330	1.104	1.601
Postpartum weight retention = current reported body weight minus pre-pregnancy weight					

Discussion

Our study indicated that the diet pattern of women during 42 days postpartum in Guangzhou, China, had characteristics of adherence to eating yang food (such as chickens, red meat and eggs) and a restricted intake of yin food (like vegetables, fruits and milk), especially in suburban area. Traditional practices of “zuoyuezi”, such as reduced physical activities and regular intake of ginger vinegar soup are used universally. Besides, our study found that health problems in women during postpartum period were highly prevalent, and the dietary and behavioral factors were related to health.

Our study revealed that nearly 80% of the women reported at least one problem during postpartum period. Reported health problems included backache (43.0%), constipation (23.6%), breast swelling (18.5%) and hemorrhoids (13.8%), postpartum weight retention (3.5 kg). Other studies have found a similar result. In a India study, nearly three-fourths of women had reported illness during early postpartum period, the common morbidities were anaemia (53.4%) fever (4%), breast conditions (4.9%), and perineal conditions (4.5%) [23]. In a cohort study in Bangladesh, nearly half (42%) of all women suffered from at least one morbidity, at 6–9 weeks after delivery, included genital infection (19%) and of urinary tract infections (12.3%) [24]. The high incidence of health problems, will not only affect physical health of both women and infants, but also cause social consequences, such as decline in the life quality during postpartum period[25]. And the logistic regression analysis in this study showed that certain postpartum dietary and behavioral practices were thought to be associated with health status.

In traditional Chinese belief, postpartum women are believed to need special dietary and behavioral approaches in the first month after childbirth to help physical recovery, which is known as “zuòyuèzi”. Those customs are associated with food taboo and confinement of practice, and vary considerably around cultures, but all focus on avoidance of yin food (raw or cold food, such as vegetable and fruits) and placement of restrictions on movement after giving birth [26]. In this study, Regular intake of ginger vinegar during puerperium was popular in Guangzhou. Previous studies supported that ginger vinegar consumption is beneficial to recovery after childbirth and stimulating milk secretion, which is also popular in Hong Kong, China [27]. But, the present study demonstrated that regular intake of ginger vinegar is a risk factor for insufficient milk secretion and prolonged uterine bleeding. Ginger was reported to improve breast milk volume in early postpartum period [28]. While another study found that cows fed with high level of vinegar yielded less milk [29]. Excessive intake of ginger will lead to hypertension, which may be contributed to increasing the risk of prolonged uterine bleeding [30]. Hence, those reported differences may be ascribed to the different consumption and proportions of ginger and vinegar.

It was found that the intakes of animal food (250–350 g/d) and vegetables (> 500 g/d) were associated with less prolonged uterine bleeding. Additionally, no negative effects of fruit and vegetable intake were found, which showed that these traditional food taboos are not reasonable. Animal food contain a lot of high-quality proteins, which is beneficial for rehabilitation. Thus, appropriate intake of animal food and vegetables during postpartum period is encouraged. Besides, our survey found that too much consumption of cereals (> 450 g/d) is a risk factor for breast swelling and leg cramps, but the modest

intake of cereals (250–450 g/d) is a protective factor for dizziness. Appropriate amounts of carbohydrate can promote physical recovery, and help maintain blood glucose, but it is not advised to be taken excessively[31].

In the present study, it was found that a range of behavioral practices are associated with health status. For instance, logistic regression revealed that breastfeeding likely to reduced the risk of backache and constipation. Breastfeeding have several health benefits for mother and baby. A follow-up study found that breastfeeding had beneficial effect on the recovery process of pelvic girdle pain after childbirth[32]. Basking is associated with less hemorrhoids, breast swelling, lactation insufficiency and backache. Outdoor sunlight and the accompanying outdoor activities during postpartum period may be good to health. And sunlight spurs the body to produce vitamin D in skin, giving them important protection from a range of diseases and enhancing skeletal health[33]. Studies supported moderate physical exercise or gymnastics after childbirth to accelerate reproductive recovery, help weight management, and enhance psychological well-being and physical fitness[34, 35]. According to the logistic regression analysis, it was found that doing postpartum exercise was related to less prolonged uterine bleeding and postpartum weight retention. Yet, resting in bed for 12 ~ 18 h/day was positively associated with backache and breast swelling, but bed rest time for greater than 18 h/d or less than 12 h/d is the risk factor for prolonged uterine bleeding, and lactation insufficiency, respectively. In addition, getting out of bed within two days after delivery was associated with less dizziness and leg cramps. And doing housework regularly during postpartum period will result in high incidence of backache and breast swelling. That is to say, regular exercise and adequate rest are equally important. A survey in the United States showed that career women were in poorer health status during postpartum period than other women, thus it is recommended to rest properly [36]. Above all, it is advisable to stay in bed for 12–18 hours a day, get out of bed within 2 days after delivery and do postnatal exercises regularly on the basis of adequate rest. However, this survey did not find any adverse effects on bathing, shampooing, brushing teeth, basking; on the contrary, basking is still promoting factors for women's puerperal health, which showed that these traditional behavior taboos are not reasonable. In summary, the above results suggested that women should pay attention to regular outdoor sunbath, postpartum excise, good hygiene status and breastfeeding during postpartum period to promote physical recovery and stay away health problems.

Strengths and limitations

The first strength of this study was to recruit women from urban and suburban areas with a large sample size as well, allowing a comparison between those with their various degrees of adherence to traditional Chinese belief and practices during the postpartum period. The second strength was that trained interviewers conducted the face-to-face surveys and used the validated food frequency questionnaire to get quantitatively and comprehensive assessment of dietary and behavioral practices.

Two limitations of this study warrant mention. First, the health problems and body weight from pre-pregnancy to postpartum were self-reported. For health problems like backaches, breast swelling, constipation, cramp, haemorrhoids, etc, reportability is probably fairly reliable, since all of the interviewers

were health professionals from maternal and child health clinic, and had trained uniformly before investigation, but self-reported maternal weight is error-prone, and the context of investigation may impact error distributions. Although the measured weight is preferable, self-report is a cost-effective and practical measurement approach for calculating pre-pregnancy BMI, and self-reported weight during pregnancy is generally considered more accurate than weight reported during other life stages[37]. Furthermore, our study converted postpartum weight retention into binary variable, and reduced the possibility of making mistakes. Secondly, the cross sectional study cannot support causality between related factors and health problems. Therefore, a prospective study is required for further research.

Conclusion

In conclusion, the detailed information about postpartum diet and behavioral practices and its association with high prevalence of maternal health problems have been documented in Guangzhou, China. Multivariate analysis revealed that some features of traditional postpartum dietary and behavioral practices of China are related to the maternal morbidity. Those information emphasized the need for health planer to establish strategies to improve puerperal health in Chinese women.

Abbreviations

DG: Dietary Guidelines; PPWR: Postpartum weight retention; BMI: Body mass index; *OR*: Odds ratio; *CI*: Confidence interval.

Declarations

Ethics approval

The study was approved by the Ethics Committees of the local Health Department and the research ethics boards of Tongji Medical College, China (trial registration: clinicaltrials.gov ID:NCT01039051), and all participants provided written informed consent.

Consent for publication

Not applicable

Availability of data and materials

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

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

YT drafted the manuscript, performed statistical analysis and interpreted the data. LM developed the survey, designed the study, critically revised the manuscript and is the correspondence author. CY and SM developed the survey, performed data collection, and data entry. WB, ZQ and YH developed the methodology, and critically revised the manuscript. All the authors read and approved the final manuscript.

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Figures

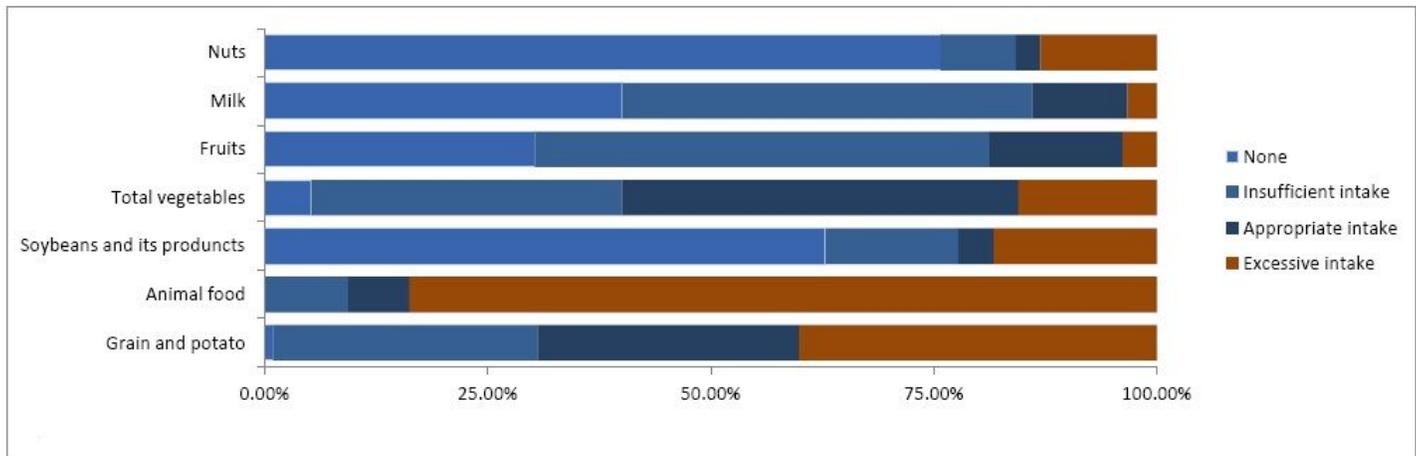


Figure 1

Proportion of women reached the dietary recommend intake (n=2013)

Supplementary Files

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