Original Article

Comparisons of four dietary assessment methods during pregnancy in Taiwanese women

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ABSTRACT

Objective: The purpose of this methodology study is to examine the relative validity of four dietary assessment methods during pregnancy and to understand the pros and cons of each method.
Materials and methods: We recruited 181 healthy pregnant women with less than 20 weeks of gestation and collected information through personal and telephone interviews in Taipei, Taiwan. Dietary assessment methods including 24-hour recalls, 3-day food records, and the weekly food frequency questionnaire during the 3 trimesters and the meal-based Chinese food frequency questionnaire (CFFQ) in the 3rd trimester were used in this prospective study.
Results: The percentages of energy from protein (15%), fat (31–34%), and carbohydrate (50–54%) were similar by the recall and record methods. The energy intakes from 24-hour recalls were 1924 kcal, 1980 kcal, and 2172 kcal in the 1st, 2nd, and 3rd trimesters, respectively. The weekly food frequency questionnaire resulted in significantly higher intakes of all energy nutrients, especially for protein and fat intakes (percentages and densities) for the 3 trimesters; a further adjustment for the food list is needed. The CFFQ showed comparable results with the quantitative methods in estimating dietary patterns for the entire pregnancy. The 24-hour recalls by telephone interviews provided reasonable results in the assessment of the average nutrient intakes during the trimesters.
Conclusion: The combinations of 24-hour recalls for the short-term dietary changes and the CFFQ for long-term dietary patterns are suggested as appropriate dietary assessment methods during pregnancy in Taiwan.
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Introduction

Dietary assessment serves as the foundation for appropriate nutrition counseling and intervention for individuals. It enables practitioners to identify both poor and desirable dietary habits and patterns, and thus is fundamental in determining the risk of inadequate intakes of specific nutrients, possibilities for dietary improvement in pregnant women. Dietary assessments for estimating nutrient intakes and food patterns serve as the foundation of human nutrition-related research. During pregnancy, the development of dietary assessment methods has two general purposes: first, to assess the dietary changes as the pregnancy progresses, and second, to capture the overall dietary information during the entire pregnancy period. Therefore, the selection and understanding of the dietary assessment methods are needed to estimate the short- and long-term dietary consumption. The aim of this methodology study was to gain knowledge and practical experience for the four dietary assessments method during pregnancy in Taiwan.

Dietary intake data can be collected using various methods including the quantitative and qualitative methods suggested by some researchers [1]. The purpose of the quantitative methods is to collect accurate information on the total actual daily nutrient intakes, such as 24-hour recalls and food records. The goal of the qualitative method represented by the food frequency questionnaire (FFQ) is to assess food groups to evaluate the usual long-term food patterns. The format consists of a selection of frequency for the food list and sometimes with another selection of portion sizes.

Most published FFQs evaluated dietary patterns from 3 months to 1 year for estimating long-term dietary consumption. To our knowledge, there is no document for FFQs covering shorter time frames such as weekly or monthly in Taiwan to illustrate possible dietary changes during pregnancy, which may be more appropriate to evaluate possible changes in food consumption during each trimester of pregnancy. Moreover, no published article has been found that evaluates the results from both quantitative methods (including 24-hour recalls and food records) and qualitative FFQ methods during the 3 trimesters in pregnancy. In the literature, surprisingly little information has been reported using the observational studies to assess nutritional status during pregnancy. Among them are majority cross-sectional approaches [2–7]; meanwhile, some dietary information has been documented by prospective cohort studies [8–11]. The purpose of this study is to compare the nutrient intakes calculated from four dietary assessment methods—24-hour recalls by telephone interviews, self-administrated 3-day food records, a meal-based Chinese food frequency questionnaire (CFFQ) [12] without portion size selections, and a weekly food frequency questionnaire (WFFQ)—to collect dietary information during pregnancy via a prospective cohort in Taipei, Taiwan [13]. We examined the advantages and disadvantages of each method, and evaluated the relative validity and agreements for these four methods for pregnant women.

Materials and methods

Participants and procedures

This study was designed as a prospective follow-up of women in early pregnancy and their children [13]. All procedures involving human participants were approved by the committee at Taipei City Hospital, Branch for Women and Children, and all individuals who agreed to participate signed the informed consent forms. We recruited women in early pregnancy at the Taipei City Hospital, Branch for Women and Children, Taipei, Taiwan between October 2002 and December 2002, and between December 2003 and February 2004 at the Obstetrics and Gynecology and prenatal care clinics. The eligibility criteria included general good health, aged 20 years and older, Han ethnicity, living in North Taiwan for more than 10 years, and less than 20 weeks pregnancy. For those who were eligible, the participation rate during the recruitment period was about 50%; a total of 181 women agreed to participate initially, of whom 168 completed the initial interviews, with one person providing only partial information. The participants in the analyses ranged from 37 in the 1st trimester to 168 during the 2nd trimester, reflecting the fact that majority of the participants were recruited during their 2nd trimester.

Trained interviewers conducted face-to-face interviews at the initial visit, and at the last prenatal care visit they collected detailed family and lifestyle information. The participants were given instructions on 3-day food record-keeping (2 workdays and 1 weekend day), and they also completed a meal-based CFFQ for pregnancy. Telephone interviews were conducted to collect monthly WFFQs and 24-hour recalls; most of the 24-hour recalls were collected on weekdays. The face-to-face interviews took 1–1.5 hours to complete, whereas the monthly telephone interviews took 30–45 minutes. In summary, our protocol was to collect one CFFQ for the entire pregnancy, from two to three 3-day food records, from three to five monthly 24-hour recall, and from three to eight monthly WFFQs for each person depending on when the participants joined the study. Except for the self-administered 3-day food records, the majority of participants agreed to answer the questions according to our protocol. Each trimester was defined as 12 weeks: prior to 12 weeks as the 1st trimester, 13–24 weeks as the 2nd

trimester, after 24 weeks as the 3rd trimester of gestational age. The nutrient intakes were averaged using the same method during the same trimester to represent the individual intakes. The average intakes of 3-day food records were also used for the individual intakes. All in all, we collected a total of 167 completed CFFQs for pregnancy, 1085 WFFQs, 338 3-day food records, and 663 24-hour recalls in the final analyses, as shown in Table 1.

Food frequency methods

We have developed two types of FFQs—WFFQ for short-term assessment and CFFQ for long-term assessment. The related food composition tables and calculation were developed based on our previous diet research experiences, especially the local food items and serving portions. The format for WFFQ is a general checklist of 15 food categories including staples, meats, fishes, other sea foods, soy products, eggs, vegetables, fruits, sweet snacks, salty snacks, dairy products, water, juices, other drinks, and an open miscellaneous group with five meal frequency (breakfast, lunch, afternoon snack, dinner, and night snack) on a weekly basis. The 15 food categories were named using simple, lay language and without detailed food lists. The participants were guided by meal sequences, and they provided the frequency of each food category for each meal in the previous week as the referent time. We collected the WFFQs by monthly telephone interviews, and this took about 10–15 minutes to complete.

The meal-based CFFQ has been documented in detail in a previous study [12]; however, we removed the portion size selections to reduce the length of the interview time. In addition, we also updated the food list according to the contemporary dietary practices in Taipei, especially considering the fast changing takeout food patterns for breakfast and lunch. The structure of the CFFQ is based on a five-meal sequence: prior to 11:00 AM (breakfast), 11:00 AM–2:00 PM (lunch), 2:00–5:00 PM (afternoon snack), 5:00–9:00 PM (dinner), and after 9:00 PM (evening snack). This version of CFFQ has a food list of 172 food groups and eight frequency selections (<1 time/month, 2–3 times/month, 1 time/week, 2–3 times/week, 4–6 times/week, 1 time/day, >1 time/day) but without portion size selections. This CFFQ for the entire pregnancy was collected during a face-to-face interview at the last prenatal visit and took about 30–40 minutes to complete.

Diet coding and statistical analyses

The dietary information and nutrient intakes were coded using standard procedures and calculated with the National Normal University Food System consisting of three interactive data management and calculation systems to process 24-hour recalls, 3-day food records, WFFQ, and CFFQ [14]. The specific food composition tables for the two types of FFQs were formulated according to the assigned food lists. The two FFQ food composition tables fixed for coding the questionnaires generated the daily nutrient intakes

Table 1
Numbers of participants and questionnaires completed for four dietary methods during the 3 trimesters.

Method	1st trimester		2nd trimester		3rd trimester		Total NQ
	NP	NQ	NP	NQ	NP	NQ	
CFFQ					167	167	167
WFFQ	74	81	167	445	165	559	1085
3-d records	37	39	130	187	103	112	338
24-h recalls	37	37	152	210	165	416	663

CFFQ = Chinese food frequency questionnaire; NQ = number of questionnaires; NP = number of participants; WFFQ = weekly food frequency questionnaire.