Validation of a Semi-Quantitative Food Frequency Questionnaire to Assess Dietary Intake in Young Adults in Makassar, Indonesia

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Abstract. In epidemiological studies, the Food Frequency Questionnaire (FFQ) is the most widely used tool for rating individuals based on long-term food consumption. The aimed of this study was to validate a semi-quantitative food frequency questionnaire (FFQ) designed specifically for measuring dietary intake in Makassar's young adults. Sixty-two respondents measured Body Mass Index, age range 18–34 years completed the semi quantitative food item FFQ with two 24-hour dietary recall (24 HR). Estimates for nutrients (energy, protein, total fat, saturated fat, and dietary fiber) and fruit and vegetable servings were compared between methods using correlation coefficients and 95% limits of agreement. T-test analysis to measure the correlation between BMI and dietary intake. Sixty-two respondents, 27 male and 35 female. All nutrients and fruit and vegetable servings showed significant positive correlations (P<0.05) except protein intake. The Semi-Quantitative Food Frequency Questionnaire is valid to measure dietary intake in the Makassar population, except that protein intake and high-energy drinks still have a bias at the group level in this young adult population.

Keywords: Validation; Semi-Quantitative Food Frequency Questionnaire; Young Adults

1 Introduction

Diet is a significant modifiable risk factor for a variety of diseases that are major causes of morbidity and mortality around the world [1]. For various public health activities, such as tracking nutritional status, prioritizing and evaluating the effect of nutrition programs and initiatives, and recognizing novel dietary risk factors for diseases, accurate information on dietary intakes is essential [2]. Since they are easier to administer in large populations and capture habitual dietary intake, food frequency questionnaires (FFQ) are the most widely used dietary instruments in epidemiological studies. It's difficult to grow FFQs in an increasingly globalized, cosmopolitan world [3]. Larger food variety can lead to more variation in food intake both within and between people, and regular out-of-home food consumption can restrict awareness of consumed food ingredients, making recall more difficult. Indonesian cuisine

dishes are notoriously complex, containing numerous mixed ingredients that can be difficult to recognize for those unfamiliar with the cuisine.

Another element to consider when determining eating patterns in cosmopolitan areas is how to account for ethnic variations in food intake. Several primary ethnic-specific food products were added to existing generic FFQs in certain multi-ethnic populations; in such cases, the validity of the amended FFQ must be tested. Multiple ethnic-specific FFQs were used in other populations, which may work well within an ethnic group but may cause comparability issues across groups. Since it is popular for people in cosmopolitan settings to eat foods from other ethnic cuisines, an alternative way is to use a single FFQ designed to cover a multi-ethnic population as a whole. While this method is likely to be more equivalent, achieving a high degree of nutrient coverage could result in a long FFQ food list [4].

For intake evaluation, validation of tools developed and implemented in the target population is needed. The food frequency questionnaire (FFQ) is a form of intake assessment that consists of a restricted list of food products whose frequency of consumption is indicated by the respondent [5]. The FFQ must be developed and validated for particular populations because social, cultural, geographic, and seasonal variations can differ greatly between and within countries. The FFQ is simple to use and administer, making it a popular method in long-term diet studies. As a result, it is important to validate the FFQ in specific societies, such as those in the eastern Indonesia, such as Makassar, where there is still no standard FFQ to assess the diet of young adults.

The aimed of this study was to validate a semi-quantitative food frequency questionnaire (FFQ) designed specifically for measuring dietary intake in Makassar's young adults.

2 Research Methods

The study included 62 adult volunteers, both sexes, between the ages of 18 - 34, who lived in the Makassar city area. The studies' relative validity is measured by comparing standard measures to data collected by the FFQ. Respondents involves three 24-hour food withdrawals on non-consecutive days, including one over the weekend, with a 5-day period between them and one FFQ at the end of the period. Paired t-test was used to examine differences in mean energy and nutrient intake derived from the FFQ and 24-hour food withdrawals. Before and after adjusting for total energy consumption, a correlation coefficient (r) was determined to compare the energy and nutrient values obtained by the two methods.

3 Results and Discussion

Table 1 shows the characteristics of the 62 participants who took part in the SQFFQ and 24-hour food memory survey. Age range: 18-24 years, 56.5% female and 43.5% male. Judging from the distribution of the group, there is obesity based on BMI as much as 64.5%, has the most snacking habits with fried foods as much as 67.7%, has a history of obesity from the age of under-five to under 12 years of age, and portion size in one meal.

Table 1. Respondents Characteristics

Variable	n	%
Gender (n=62)		
Male	27	43.5
Female	35	56.5
Body Mass Index		
Normal	22	35.5
Obese	40	64.5
Snacking Habit		
Steam food	10	16.1
Fried Food	42	67.7
Fatty Food	6	9.7
Others	4	6.5
History of Obesity (n=40)		
Since Toodler	4	8.1
Since Aged 6-12 years	21	33.9
Since Over >12 years	15	24.2
Size Portion in one meal		
One plate	48	77.4
One half plate	4	6.5
Two Plate	10	16.1

Table 2 shows the comparison of the nutritional content of dietary consumption derived from SQFFQ and the average FR24h results of three measurements. based on the mean and SD values of the paired t test, respectively. The results show that the macronutrient group shows the same results with a significant value of more than 0.05. whereas for the micronutrient content the results were significantly different.

Table 2. Energy and nutrients from Semi Quantitative-Food Frequency Questionnaires (SQFFQ) and Food Frequency 24h

Nutrient	FR24h (Mean, ±SD)	SQFFQ (Mean, ±SD)	Sig.
Energy (Kcal)	1.4038 (0.904)	1.554 (0.55)	0.285
Cholesterol (mg)	230 (159)	189 (191)	0.221
Macronutrient			
Carbohydr (gr)	178 (188)	209 (121)	0.266
Protein (gr)	45.32 (25.59)	206 (121)	0.000
Fat (gr)	47.75 (24.35)	38.50 (38)	0.160
Dietary Fiber (gr)	6.426 (3.97)	21.15 (11.7)	0.000
Micronutrient			
PUFA (gr)	12.73 (8.43)	7.87 (5.75)	0.001
Vit. C (mg)	18.04 (29.87)	46.34 (57.59)	0.002
Iron (mg)	7.49 (8.89)	18.44 (6.7)	0.000
Zinc (mg)	5.501 (3.1)	9.42 (3.3)	0.000

Discussion

We examined the validity of the SQFFQ for assessing various micro and macro nutrients among young adults in Makassar. The results show that the tool is reproducible and has good validity. To get a picture of the pattern of nutritional consumption in the larger community in completing the SQFFQ is very important to achieve valid results in our study. As previous studies standardized their FFQ along with 24HR, A total of 31 3-day food records were used to validate the FFQ (FR). Between the two instruments, there was no substantial difference in average energy consumption, most macronutrients, and some micronutrients. The connection between the two instruments was found to be suitable (0.39–0.69) [6].

The number of FFQ and 24HR recorded to the analyses with FFQ varied between studies, with at least one 24HR recorded to the analyses with FFQ[7-10]. More frequent consumption items, such as grains, dairy products, fruits, vegetables, and carbonated drinks, had a higher correlation than less frequent consumption items, such as legumes, fast foods, nuts, and hot beverages, which had a weak correlation compared to other items, as in a previous study in Iran [11].

In our research, we show that the use of the 24HR gold standard to assess consumption intake in Makassar adults also has similarities with using the SQFFQ method. So we think that using SQFFQ with a collection of types of food ingredients that we have previously collected is efficient enough to be carried out on adult respondents in Makassar. Because the city of Makassar has a large population diversity as one of the metropolitan cities in the eastern part of Indonesia.

The validity correlation between SQFFQ and 24HR was similar to that reported in other studies. For the validity study, it was shown that the mean CC was 0.35 and remained stable after adjusting for energy or CC nutrition. The validity of the 17 nutrients in the SQFFQ survey correlated with the outcome considering the 3-day diet [12]. Another study demonstrated the Spearman correlation coefficient, comparing intake of food groups based on two methods of assessing diet ranging from 0.25 (meat) to 0.62 (tea and coffee) in men and from 0.39 (wheat) to 0.60 (sugar) in women. The Pearson correlation coefficient for energy and macronutrients is 0.53 for energy to 0.21 for zinc in men and 0.71 for energy up to 0.26 for vitamin C in women [13]. Other studies have shown that this questionnaire provides a reasonable measure of macronutrients and micronutrients. However, questions regarding nut consumption and protein intake need to be investigated further and it is suggested to conduct further studies with larger and larger populations in the next 24 hours.

Another study showed that the mean intakes of iron, copper, and selenium estimated by the SQFFQ were significantly higher than those from 24HR. However, estimates of the two methods of iron and selenium intake were substantially correlated. The Bland-Altman study revealed that while the differences in iron intake determined by the two methods were identical across intake ranges. [15]. In our study, the micronutrient content had significantly different mean values, which is the same as in this study. This difference has a significant number meaning the average 24HR measurement gets higher results for micronutrients.

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Another study showed that the relative validity of PUFA intake data for women and n-3 HUFA in both sexes, assessed by FFQ compared to plasma 24HR concentrations, was moderate. However, no significant association was found for saturated, non-fatty fatty acids. Sour. Mono-saturated or n-6 PUFA [16]. Likewise, the PUFAs were different in our study, but the validity measurement showed satisfactory results.

Another study on SQFFQ for seven days in Bangladesh is one answer to the challenge of using only FFQ, which has a fairly high bias in the calculation of consumption surveys in community groups. Validation studies should ideally be performed using recovery biomarkers such as double-labelled water, potassium, and nitrogen markers in 24-hour urine samples to confirm total energy consumption, potassium intake, and protein intake. More than 24 hours will certainly lead to a higher deal rate [17]. This research was conducted as a pilot study. Further investigations need to develop this questionnaire. This information indicates that the SQFFQ for young adults has an acceptable level of reproducibility and validity which can be considered a suitable tool for the urban population of Makassar.

4 Conclusion

In conclusion, we offer a valid SQFFQ that can help understand dietary risk factors for conditions affecting adults in Makassar City. Future work could examine measurement of consumption patterns as biomarkers of food-related disease.

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