

Validation of FFQ Against Food Records for Vitamin D in Qatar Population

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ABSTRACT

Background: Measurement of vitamin D nutritional status through dietary assessment is a cost effective method. The Food frequency questionnaire (FFQ) is usually validated against food records (FR). There is no vitamin D specific FFQ for Qatar population

Objective: The objective of this study was to develop a vitamin D centric FFQ and validate FFQ against 3-day FR for Qatar population.

Methodology: A quantitative FFQ based on vitamin D containing foods consumed in Qatar was developed. Vitamin D content of foods were gathered from food labels and food composition tables from the USDA. A vitamin D content database was developed for this study purpose. Dietary intakes using FFQ and 3-day FR were collected from 62 participants. Vitamin D intakes from FFQ and 3-day FR were validated with quartile comparison and Bland-Altman (BA) tests.

Results: BA plot showed an agreement between FFQ and 3-day FR vitamin D intakes. BA index was 3.23%, which is <5%, a commonly used standard for validation. Quartile correlation showed ≈73% of the subjects were within 1 quartile difference.

Conclusion: In conclusion, an agreement was found between vitamin D intakes from FFQ and 3-day FR. This indicates that the FFQ can be used as a valid dietary method to assess vitamin D status in Qatar's population

INTRODUCTION

Vitamin D is a lipophilic vitamin and Its synthesis is highly variable due to many factors. Research shows hypovitaminosis D has been related to many non-calcemic ailments although still under investigation. Due to limited sunlight exposure in Qatar, vitamin D from dietary sources is important. Measurement of vitamin D by dietary assessment has been found to be a cost effective and suitable method for screening of nutritional status at a population level. The Food frequency questionnaire (FFQ) is a useful method of dietary assessment because it captures the long-term dietary intake of populations and also has a less respondent burden. FFQs are commonly validated against food records (FR), which is typically known as the 'gold standard' reference for dietary assessment. There is no vitamin D-specific FFQ developed for the Qatar population. Therefore, the objective of this study is to develop a vitamin D-specific FFQ and to validate this FFQ against FR for the population in Qatar.

METHODOLOGY

Food that contained vitamin D were collected from Qatari markets and from the USDA food composition data base. In addition, traditional food recipes that contain vitamin D were gathered from cook pads and websites specialized for Qatari food recipes. Throughout this research, it was taken into consideration lifestyle factors besides dietary factors. Such as, having an intolerance or allergy or if they are vegan or vegetarian. Vitamin D rich food were listed in the FFQ with the serving size for each specific food. Moreover, 5 columns that consisted of never, daily, weekly, monthly, and yearly were added as a heading to determine the quantity of food being consumed. When it comes to the 3-Days Food Record (3DFR), it was distributed with instructions and a handy serving size guide to ease the document filling. The 3-DFR contained 3 separate tables that required the subject to fill in the time, date, day of the week, food detail and amount. Each table is filled based on the day the food is consumed. It was obligatory of them to fill 3 days; 1-weekend and 2-weekdays. The FFQ and 3-DFR were collected from Human Nutrition students currently studying in Qatar University and all the subjects consisted of females who were at least 18 years old, having knowledge about serving size and lived in Qatar for at least 2 years. FFQ and 3-DFR were distributed to 88 subjects however, only 62 subjects completed the study. The response rate was 70.5% and the average of Vitamin D intake of FFQ was calculated for each subject, then it was compared to the results obtained in the 3-DFR. Vitamin D status was obtained for each subject and a bar chart was using vitamin D intake (< 400 IU) as deficiency, (400-599 IU) for insufficiency and (≥600 IU) as sufficient. The data were also validated using Bland-Altman test, quartile correlations and spearman test.

RESULTS

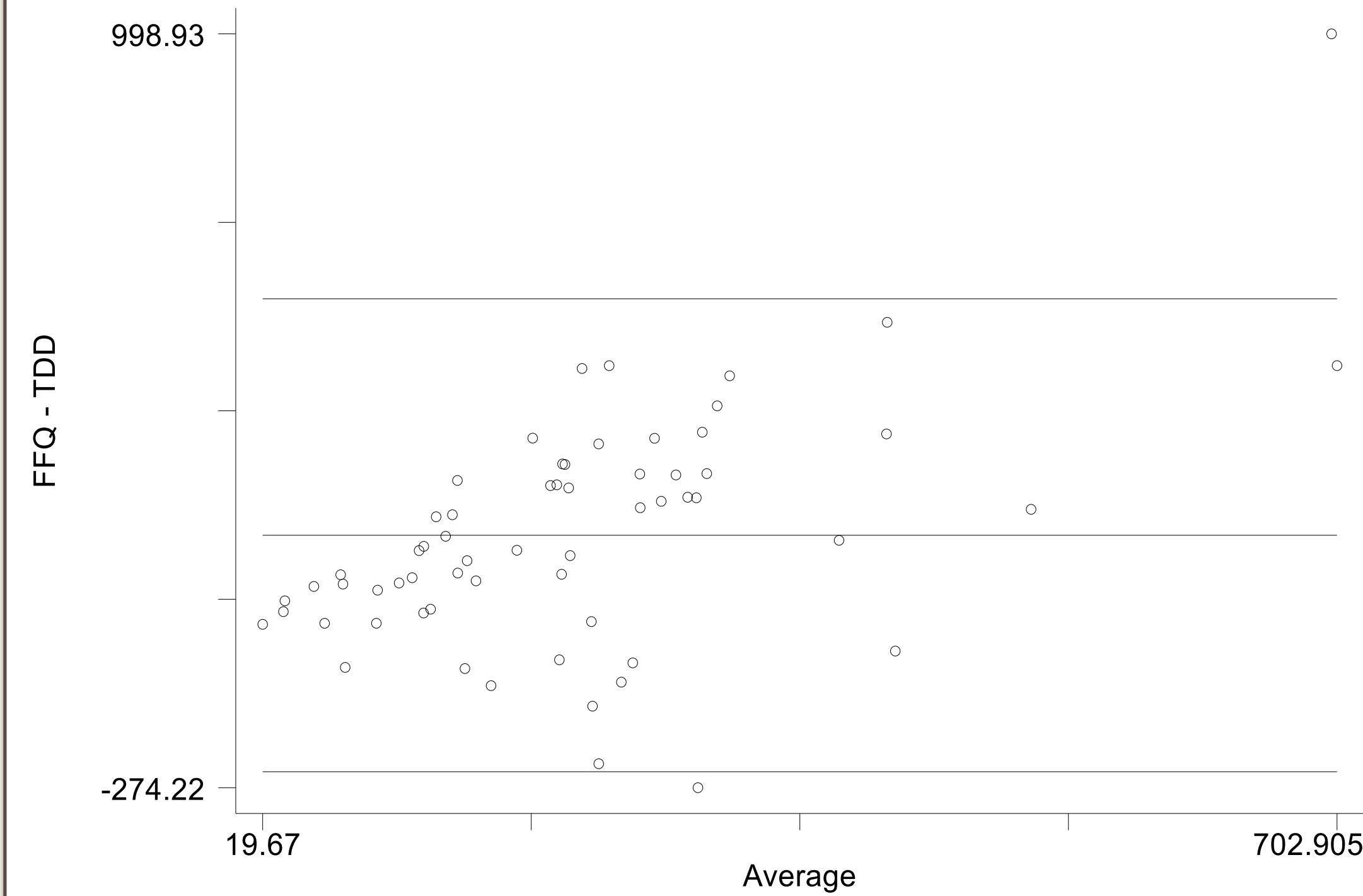


Figure 1. The Bland - Altman plot of the FFQ against the 3-DFR

The level of agreement between the FFQ and the 3-DFR in relation to vitamin D intake within all subjects (n=62) is presented in the Bland Altman plot shown in figure 1. The mean difference between the FFQ and 3- DFR for vitamin D intake was 152.1 IU. The plot shows the upper agreement level as 551.5, and the lower agreement level which is -247.3. The results were positioned between this limit ranges with a Bland Altman index of 3.23% ,indicating an agreement between the two methods

Table 1. Quartile correlation of vitamin D intake from food frequency questionnaire and 3-day food records

Quartile difference	Frequency, n	%	Cumulative, n (%)
Classified into same quartile	23	37.10	23 (37.1)
Classified into adjacent quartile (±1)	22	35.48	45 (72.58)
Classified into distant quartiles (2 quartiles apart)	13	20.97	58 (93.55)
Classified into opposite quartiles (misclassified)	4	6.45	62 (100)
Total	62	100	100

Quartile comparison between the vitamin D intakes from FFQ and 3-day FR is presented in Table 1. Out of 62, 45 (≈73%) subjects' vitamin D intake obtained from FFQ and FR tools were categorized into the same or adjacent (± 1) quartile. Only 4 out 62 (≈6%) participants' vitamin D intakes were placed in the opposite quartile (misclassified). This quartile classification from both tools indicates a good agreement between these two dietary assessments.

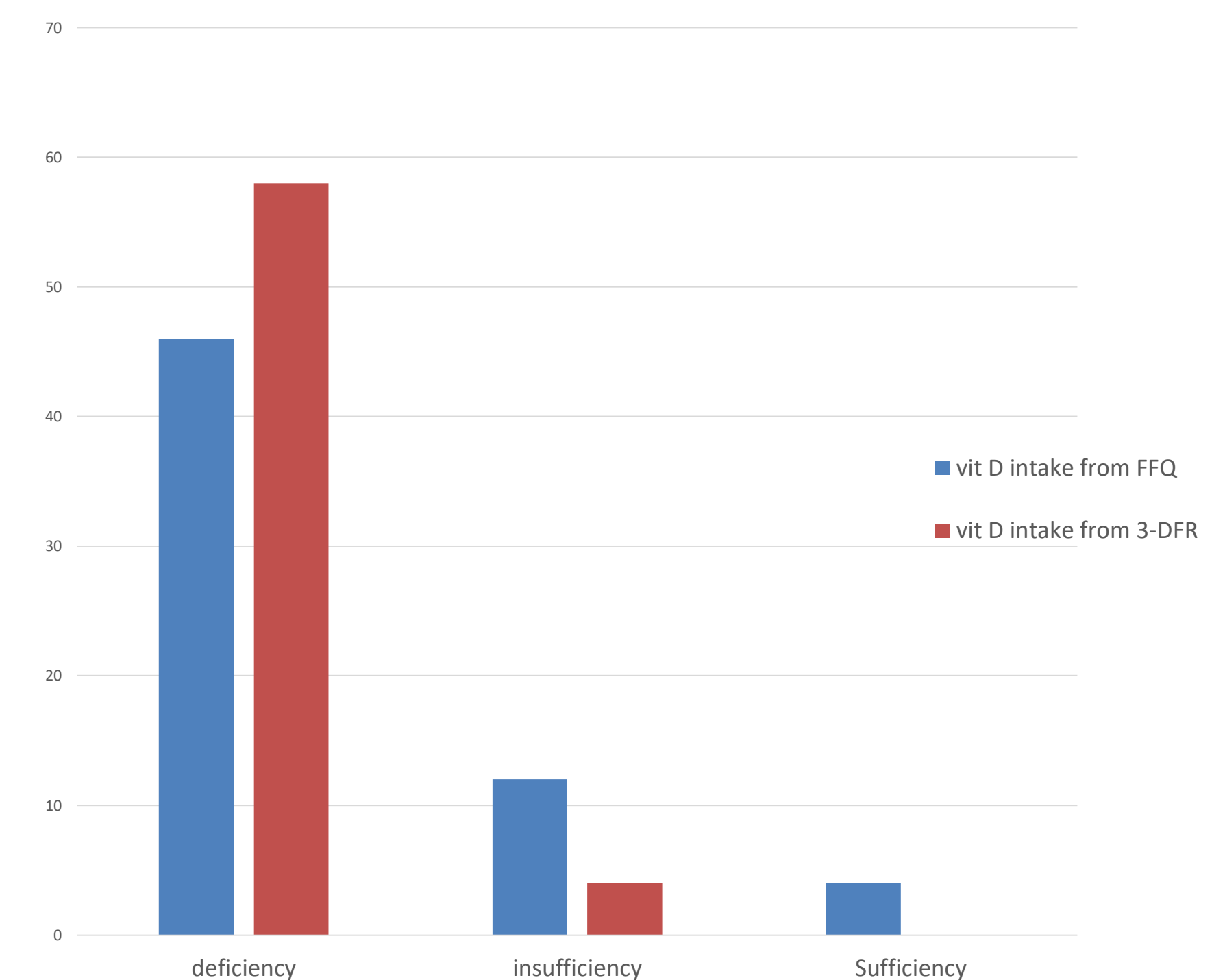


Figure 2. Dietary vitamin D status based on FFQ and 3-DFR

The vitamin D intake obtained from both the FFQ and 3-DFR was interpreted into a graph as shown in figure 2. According to the vitamin D intake from FFQ, 46 subjects were deficient (74%), 12 subjects were insufficient (total insufficient were 46 + 12 = 58), and 4 subjects (6%) were sufficient (Figure 2). Moreover, the vitamin D intake from 3-DFR, showed 58 subjects being deficient, 4 insufficient and none of the subjects were sufficient (Figure 2).

CONCLUSION

In conclusion, an agreement was achieved between the vitamin D intakes of FFQ and 3-day FR based on the results from the BA agreement plot and the quartile classification. This further indicates that the FFQ can be used as a valid dietary method to assess the vitamin D nutritional status for Qatar's population.

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