CHAPTER IV

DISCUSSION

It has been well established that the folic acid contents in various foodstuffs are quite different. A high folic acid content is reported to be found in fresh green vegetables, yeast and liver. Some fruits also contains a relatively high folate content. Foodstuffs with lower folic acid contents were asparagus, spinach leaves, lettuce and broccoli, while the poor folate sources were eggs, milk, meats and poultry (Herbert, 1968[a]).

Results in the present study showed that fish sauce and soya-bean sauce contained a relatively high folic acid i.e. 178.6 ng/ml and 252.1 ng/ml respectively. There was a direct relationship between the folic acid contents in the fish sauce samples and their prices, while this relationship was not demonstrated in soya-bean sauces. Fish sauce and soya-bean sauce were normally consumed without any further cooking in this country. The consumers of these 2 sauces would therefore obtain the whole amount of folic acid. Assuming that the average daily consumption of fish sauce in Thai people is 15 ml per person, one should obtain 0.6 - 8.0 µg of folate per day from uncooked fish sauce. If the same daily amount of soya-bean sauce was consumed, one should obtain also 0.3 - 15.0 µg of folate per day.

It has been shown that a considerable amount of folates in foodstuffs was diminished by protracted cooking or by canning. Steaming vegetables such as beets, cabbages, carrots and potatoes for 20 - 60 minutes resulted in loss of 92 - 97 % of the folates (Cheldelin et al, 1943). Beef and pork lost 76 - 95 % of folic acid while fish and chicken lost between 62 - 74 % of their folate after cooking for 10 - 15 minutes (Schweigert et al, 1946).

The effect of heating on the folic acid content was clearly shown in milk samples. Ghitis (1966) found that boiling of the pasteurized milk for 5 minutes resulted in loss of 70 - 90 % of its folate content. Fresh milk lost 50 - 60 % of its folate content after treatment under the same condition (Chanarin, 1969).

Milk samples in the present study were autoclaved with the presence of ascorbic acid for preventing heat destruction before assaying for folate content. The result showed that the folate contents in milk samples in the present study were very similar to those reported by the other authors.

In comparison the folate content of canned fruit juice to that of the fresh fruit juice, the former usually contained less folic acid than the latter. For example, the folate content of apple juice declined from 1.0 μg/100 g to 0.2 μg/100 g while those of orange juice and pineapple juice were less affected (Hardinge and Cooks, 1961). Results in

the present study showed that fresh fruit contain higher folic acid than canned fruit juice, i.e. the folic acid contents of fresh fruit were 232 - 252 ng/g for orange, 86 ng/g for pineapple, 45 ng/g for grape and 295 ng/g for fresh tomato, while the folic acid content of canned fruit juice were 62 ng/ml for orange, 71 ng/ml for pineapple, 4 ng/ml for grape and 193 ng/ml for canned tomato juice. The reduced folic acid content in canned fruit juice was possibly due to the process of preparation which destroy their folic acid contents.

Findings that the canned tomato juice contained the highest amount of folic acid in the group of canned fruit juice in the present studies was probably due to the fact that the tomato juice contained a high amount of vitamin C which would protect the folate from oxidative deterioration. In comparison our findings with the results of the other authors, the folic acid content of canned orange juice and canned grape juice in the present studies were slightly lower than those of the other authors except the canned tomato juice which was identical.

Folic acid content in fresh fruits showed a great variation among the different kinds of fruits and between the individual assays of the same kind of fruits. This variation was possibly due to several factors, i.e. (1) an actual variation in folate content from one individual fruit to the other (2) a variation caused by the necessary

dilution of the juice prior to assay (3) varying amounts of pulp per unit weight of fruit samples and (4) a variation in maturity of fruits in each assaying experiment (Streiff, 1971). The effect of respiration and enzymatic activity during storage of fruits may also play a role in the variation of folate content.

Results in the present study showed that low folate content was found in grape and coconut milk, while papaya, tomato and orange contained rather high folate level. The comparison between the folate content of fresh fruits in the present study and the other reports was shown in Table 13. The folate content of pineapple and grape in the present study showed lower results than those of the other authors, while tangerine, papaya and watermelon showed higher folate content than the other reports. The difference in these results was possibly due to the variation of the individual fruits and the methods of preparation.

The human requirement for folate is approximately 50 µg daily in adults while the recommended daily dietary intake is 200 µg of free folate (Herbert, 1968[c]). The recommended folic acid content corresponds to 1,200 ml of fish sauce, 800 ml of soya-bean sauce, 1,500 ml of cow's milk, 6,200 ml of human milk, 3,000 ml of canned fruit juice and 1,100 g of fresh fruits.

As mentioned earlier, a high folic acid content was found in fresh green vegetables, yeast and liver while the

poor sources were eggs, milk, meat and poultry. It is therefore highly recommended from the present study that the green vegetables should be included in daily meals. Foodstuffs such as meat, milk, fresh fruits and canned fruit juice supply not enough folic acid for daily requirement unless one consume a considerable amount of such foodstuffs as shown in the above discussion.