

EFFECT OF COOKING ON AMINO-ACID CONTENT OF FOODS, COOKED BY DIFFERENT METHODS

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The need to be able to express the nutritive value of the different proteins rather than to think of all proteins as being equal has got to be recognised more and more.

The absence of any one of the indispensable amino-acids will result in incomplete utilisation of the remainder. The biological value of proteins may be related not only to their content of indispensable amino-acids but to the relative rates of their release in and absorption from the intestinal tract.

Amino-acids may be present in a protein but not liberated during digestion, and therefore, be unavailable. The release of amino-acids during the digestive changes in the gastro-intestinal tract may to a certain extent, depend on the changes in the amino-acid composition of foods during predigestive processes, to which foods are subjected, like that of cooking etc. For example, in the case of cooked and stored proteins, Lysine combines with sugars and cannot be liberated by enzymatic attack. (Special article, *Lancet*, 1953; Hawk *et al.* 1957). It is therefore necessary to study the composition of foods with regard to their amino-acid contents both before and after cooking.

MATERIALS AND METHODS

The articles of food were analysed for their amino-acid content in the pre-cooked and cooked conditions, according to the methods described below :

The pre-cooked condition consisted of analysis in the following stages : a portion of the raw material to which condiments etc. were added during the cooking procedure of the article of food, is cooked. Here in order to have a comparable data of the composition in the pre-cooked stage for comparison with that of the cooked material, the condiments etc. were added in the same proportion as are added during cooking and they were mixed with the articles of food after the treatment of washing and/or mincing

etc. as the case was, depending on the nature of the article which was to be cooked.

The above mixture was divided into two parts (1) one portion was used for the analysis of the material in the pre-cooked stage and (2) the remaining portion was further sub-divided into two portions and these two portions were subjected to two different types of procedures of cooking, namely, (a) direct application of heat and (b) steam-cooking in an ordinary cooker without pressure.

The articles of foods were prepared as described in the earlier communications (Pai, 1954, 1957, 1958). The preparations of foods were selected and they were such as are generally taken by the people living in Gujarat. A few such samples have been studied.

The methods have been standardised for the quantitative estimation of amino-acids in foods in their pre-cooked and cooked conditions. The procedures of cooking of the different articles of foods studied were, as follows: (1) Cooking by direct application of heat and (2) Cooking by steam-heating in closed containers in an ordinary cooker.

The samples were analysed in the pre-cooked and cooked conditions. The amino-acids were estimated in the hydrolysate, of the sample by the filter paper-chromatographic technique using butanolacetic acid, water mixture, (4:1:5) as a solvent. The paper-chromatograms were then read, after colour development with ninhydrin reagent, on the Densitometer. Curves were plotted from the densitometric readings of the unknown, which were compared and the areas computed with the curves obtained from the similar readings for the standard amino-acid mixtures.

RESULTS AND DISCUSSIONS

The results of analyses of the material in the pre-cooked condition to which condiments etc. were added, and of the material cooked by two different methods of cooking, namely, one by the direct application of heat and the other by the steam-cooking in an ordinary cooker, have been shown in the table. The amino-acids contents are expressed in gms. per 100 gms. of the food-stuff on the dry weight basis. The above analyses were done in duplicate for each of the samples studied and the results given in the table (vide table) are the average values thereof.

It can be seen from the table, that there is a slight difference in the composition of amino-acids contents of the materials studied in pre-cooked and cooked conditions. There is a slight loss of amino-acids during cooking. The loss of amino-acids seems to be a little more in case of the material sub-

jected to cooking by direct application of heat than that in the case of material cooked by the second method, namely, steam-heating in an ordinary cooker.

TABLE I

Table showing some of the amino-acid content of foods in cooked and pre-cooked conditions.

(on dry-wt. basis).

(in gms./100 gms. of the food-stuff.)

S. No.	Amino-acids.	Raddish (white) Pre-cooked with condi- ments added	Raddish (white) cooked with direct heat	Raddish (white) steam-cooked in an ordinary cooker.
1.	Cystine	0.461	0.363	0.449
2.	Lysine	0.282	0.262	0.248
3.	Arginine	1.680	1.000	1.240
4.	Threonine	0.494	0.344	0.464
5.	Glutamic acid	0.113	0.087	0.086
6.	Tyrosine	0.053	0.052	0.056
7.	Valine	0.216	0.208	0.210
8.	Leucine	0.290	0.238	0.264
9.	Isoleucine	0.280	0.230	0.256
10.	Phenylalanine	0.198	0.184	0.180

SUMMARY AND CONCLUSIONS

1. Amino-acid content of food-material in the pre-cooked and cooked conditions have been studied with the help of filter-paper chromatographic technique. Their quantitative estimation was done with the help of densitometer.
2. The cooked material was subjected to two different types of cooking, namely, by direct application of heat on one hand and by steam-cooking in an ordinary cooker, on the other.

3. There was a little loss of amino-acids during cooking, by either of the methods.
4. The loss by the direct application of heat method was little more than by the cooker method.

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