

LETTER TO THE EDITOR

## IMMEDIATE METABOLIC EFFECTS FOLLOWING ORAL INGESTION IN HUMANS - *A PRELIMINARY REPORT*

Sir,

( Received on July 9, 1985 )

It is well documented that metabolism increased a few hours after food ingestion (1) and also the extent of rise depends amongst other factors on the nature of the food consumed. We have tried to investigate the immediate effects on metabolic rate following oral ingestion in human subjects.

The subjects were 22 male students between 17 and 25 years of age. Their detailed dietary and personal history was taken to find out their dietary habits and caloric intake. Further assessment of nutritional status was carried out by the measurement of skin fold thickness with UNA's calipers. The sites of measurement included the triceps and subscapular region (2).

Oxygen consumption was determined for 6 minutes by closed circuit spirometry in overnight fasting subjects after they had rested for half-an-hour in a comfortable environmental temperature ranging from 20-25°C in the recumbent posture. Metabolic rate was calculated from oxygen consumption. A test meal of 200 ml milk at room temperature was given to the subjects and oxygen consumption determined at 5 and 15 min and metabolic rate calculated. Same procedure was repeated in a group of 10 subjects with carbohydrate solution as the test meal.

Following milk ingestion two types of responses were noted (Tables I and II). In one group of 12 subjects the metabolic rate showed an increase to the extent of 19% at the end of 5 min and 27.9% at the end of 15 mins, both being significantly different from the base-line value. In the other group of subjects there was a decrease in metabolic rate at the end of 5 minutes to an extent of 9.5% and a slight increase of 5.38% at the end of 15 minutes. These changes were however not significant statistically.

Following carbohydrate ingestion (Table III) a slight increase in metabolic rate of 1.5% at the end of 5 min and 2.5% at the end of 15 min was observed which is not significant.

TABLE I : Metabolic responses following milk ingestion.

Sub.	S.A. (m <sup>2</sup> )	Skinfold thickness (mm)	Cal. Intake/ 24 hrs	M.R. (Cals./M <sup>2</sup> /hr)		
				B	5 min	15 min
1.	1.85	11.5	2000	39.6	45.2	49.6
2.	1.54	10	2400	40	45.4	51.5
3.	1.60	10.5	2200	48.5	51.8	55
4.	1.93	15	1900	44	49	52.4
5.	1.92	14	2200	43.2	47.5	58.6
6.	1.60	10	1700	37.8	40.2	42.5
7.	1.43	10	1500	38.4	47	52.4
8.	1.77	12	2200	39	47	52
9.	1.76	11	1700	44	47	47
10.	1.86	11	2650	40	48	48
11.	1.76	11	2540	41	43	43
12.	1.68	9	1500	43	47	51

Mean ± SE

39.04 ± 1.22

46.49 ± 1.02  
(+ 19%)

49.95 ± 1.33  
(+ 27.9%)

An increase in metabolism in about 5 min has been reported by Passmore and Ritchie (4) as has also been observed in the present study in one group of subjects. However, the different response observed in another group of subjects may be related to their dietary habits and nutritional background since the subjects in group I were non-vegetarians and in group II were vegetarians. At present it is difficult to say the exact cause of this differential response obtained since these are preliminary studies.

TABLE II : Metabolic responses following milk ingestion.

Sub.	S.A. ( $m^2$ )	Skinfold thickness (mm)	Cal. Intake/ 24 hrs	M.R. (Cals./ $M^2$ /hr.)		
				B	5 min	15 min
1.	1.67	11	1700	42	37.4	44
2.	1.62	9	2500	54.4	50.2	57
3.	1.55	10	1600	42.8	37	45
4.	1.55	10.5	1600	47	33	48.8
5.	1.78	11	2300	38.8	35.5	45.7
6.	1.74	11	1900	42.4	39.8	42.5
7.	1.62	10	2000	42	40	46
8.	1.87	12.5	2500	37	33	37
9.	1.76	11	1700	39	38	41
10.	1.72	12	2000	38	36	39
Mean $\pm$ SE				41.75 $\pm$ 1.63	37.77 $\pm$ 1.55 ( - 9.58% )	43.95 $\pm$ 0.65 ( + 5.38% )

Carbohydrate intake in a group of 10 subjects has not shown any differential pattern of response. It is possible that responses for each type of food stuff are mediated via different receptors and pathways.

It may be pointed out at this stage that certain adaptive changes do occur in cases of varying protein intake (6). Changes in liver enzymes have been demonstrated by Stephen and Waterlow (5). Also specific dynamic action of various amino-acids differs considerably in relation to calorogenic effect (3).

TABLE III : Metabolic responses following carbohydrate ingestion.

Sub.	S.A. (m <sup>2</sup> )	Skinfold thickness (mm)	Cal. Intake/ 24 hrs	M.R. (Cals./m <sup>2</sup> /hr)		
				B	5 min	15 min
1.	1.85	11.5	2000	38	38	38
2.	1.93	15	1900	47.2	49.2	49.4
3.	1.92	14	2200	41.8	43.4	43.7
4.	1.43	10	1500	34	34	35
5.	1.62	9	2500	38.5	40.4	40.4
6.	1.60	10	1700	38	38	38.5
7.	1.76	11	1700	40	40	40.5
8.	1.87	12.5	2500	37	38	38
9.	1.72	12	2000	38	38	38.5
10.	1.55	10	1600	42	42	42.5
Mean ± SE				39.5 ± 1.12	40.1 ( ± 1.30 ) ( + 1.5% )	40.5 ( ± 1.26 ) ( + 2.5% )

Due to non-availability of data in this field and small number of cases in the present study, a generalisation on these grounds is difficult and further work is needed to provide a more definitive answer.

VEENA MEHTA\* AND S. BHATIA

*Department of Physiology,  
University of College of Medical Sciences,  
Ring Road, New Delhi - 110 029*

\*Present address : Department of Physiology, Maulana Azad Medical College, B.S. Zafar Marg, New Delhi - 110 002.

REFERENCES

1. Durnin, J.V.G.A. Calorie Balance in man. *Proc. Nutr. Soc.*, 20 : 52-58, 1961.
2. Jelliffe, D.B. and E.F.P. Jelliffe. An evaluation of upper arm measurement used in nutritional assessment. *Am. J. Clin. Nutr.* 33 : 1980.
3. The Heinz handbook of nutrition. Energy metabolism B.T. Burton, Eds (Mcgraw-Hill book company, London, New York, Toronto) p. 81, 1959.
4. Passmore, R and F. Ritchie. The specific dynamic action of food and the satiety mechanism. *Br. J. Nutr.*, 11 : 79-85, 1957.
5. Stephen, J.M.L. and J.C. Waterlow. Effect of malnutrition on activity of two enzymes concerned with aminoacid metabolism in human liver. *Lancet* 1 : 118-119, 1968.
6. Waterlow, J.C. Observation on the mechanism of adaptation to low protein intakes. *Lancet*, 2 : 1091-1097, 1968.

(Received 15.12.85)

[Due to non-availability of data in the field and small number of cases in the present study a generalisation on these grounds is difficult and further work is needed to provide a more definitive answer.]

VEENA MEHTA\* AND S. BHATTIA

Department of Physiology,  
 University of Calicut, Medical College,  
 P.O. Box 110, Calicut - 673 002

\*Present address: Department of Physiology, Medical College, S.S. Jalar, Kerala,  
 P.O. Box 110, Calicut - 673 002