The Effects of Feeding Dry Human Placenta as the Only Source of Protein to Pregnant Rats—Investigation on the Nitrogenous End-Products of the Urine

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ABSTRACTS

An investigation was made into the urinary excretion of the various nitrogenous components and the gestational performance of the pregnant rats to be tried in feeding with the crude human placenta powder as their dietary protein source. There were found to excrete more urea, creatine, creatinine and total nitrogen in the placenta-fed than in the egg york-fed mother rats. Both the maternal weights and the urinary ammonia were decreased but the litter sizes and the individual birth weight of the offsprings were not affected in response to feeding with the placenta. Based on the maternal protein nutrtion, it was also shown that the urinary urea nitrogen/total nitrogen ratios of the placenta-fed group was no significant difference from those of the controls almost over the entire period of gestation.

Many mamals are known to eat their own placenta. And oral feeding of dry cattle placenta has been found by Sulimova etal[1] to improve appetite, food absorption and growth in different types of livestock. The dry human placenta powder was applied as the source of protein in the feeding experiment by Bamji etal[2] indicated that the growth of the animals on the placenta diet was as good as on the casien diet and suggested that the human placenta is a rich source of protein and other nutrients, such as vitamins, hormones and minerals.

As a trial to be unconventionally made as whether the dietary placenta powder would be also favorable to the pregnant livestock, this report dealed with the effects of feeding dry human placenta as the only source of protein to the bred rats. In the present study, the several urinary nitrogenous products were analyzed especially for discussion whether there is any evidence to improve the maternal nutrition of the tested animals fed on placenta diet during pregnancy.

MATERIALS AND METHODS

The treatment of the materials :

a. Preparation of the dry placenta powder.

Fresh human placenta of the prepamirae after the first male birth were collected and brought to the laboratory, then were washed, demembraned and minced into pieces, dried at 50°C in the vacuum oven and powdwered.

b. Preparation of the egg-york powder.

The cooked egg-yolk was extracted out of oil with n-hexane, dried at 60°C, powderized and used as the control as designed by Prof. Yang.

c. Determination of the protein content by nitrogen analyzer.

The crude protein content of the treated placenta is 81.1% and that of the treated egg-york is 57.5%.

The composition of the test diets :

Table 1 The Composition of the Diets *

Components	The Basal	The Control	The Experimental
Protein 16% level	Casein 18.5	Egg-yolk Powder 27.8	Placenta Powder 19.7
Corn starch	58.5	49.2	57.3
Sucrose **		10.0	
Peanut oil		3.0	
Soybean oil		3.0	
Hegested's salt		4.0	
Panvitan		1.0	
Fiver		2.0	

* Values are represented as %.

** The following components are equally added into the different diets.

The dietary protein level was fixed at 16% referred to the nutritional studies in pregnancy [3].

The experimental Design :

Thirty eight female rats of Long Evans strain were selected after weanling and were fed on stock diet [4] for 19 weeks. Then 13 female rats of them were reselected as test animals based on the resemblance of their growth curves and were divided into 2 groups i.e. 7 in the experimental group and the other 6 in the control group. These 13 female rats were fed on a basal diet for one week before-mating and were transferred to individual screened-bottom cages. Soon after conception, the experimental rats were fed with the placenta diet and those of the control with the egg-york diet during pregnancy. The daily food intake was restricted to a 5% level of the body weight at the commencement of the test for all of the rats throughout the whole experimental period. The determinations were divided into 9 periods of 3 days interval i.e. 2 periods of before-mating and 7 periods of gestation. Each urine sample was collected into a 50 ml of the 1% v/v formaline solution and then was analyzed. The maternal body weights and the live-birth weights of the offsprings were recorded.

Methods for the analysis of the urine sample :

a. Urea nitrogen.

Erich Bernt and Hans-Ulrich Bergmeyer method [5]

b. Urinary ammonia nitrogen :

Folin & Bell: Permutit method[6].

c. Creatine and creatinine.

Folin method[6]

d. Total urinary nitrogen:

Coleman nitrogen analyzer method[7].

RESULTS and DISCUSSION

The urinary excretion of total nitrogen and several nitrogenous end-products primarily related to the protein metabolism for the bred rats were measured as shown on Table 2. Urea and total nitrogen were significantly excreted at a high level after feeding the placenta over the whole period of gestation (the first 2 weeks $P<0.01$; the last $P<0.05$ for total nitrogen, $P<0.01$ for urea except that at the very first and the last periods of gestation). It was possibly considered that a lot of free amino acids had to be decomposed despite the gestational demand in the placenta-fed rats.

The excretion of creatine and creatinine was also noted more extensive all over the entire period of pregnancy in the placenta group, significantly during Period 5 to 7 ($P<0.01$) and period 3 to 5 ($P<0.05$) for the former and the later respectively. Comparing the maternal body weight changes as recorded on Table 3, we found that the growth of the placenta-fed mother rats was retarded during the early gestational stage before the rapid growth of the fetuses, while the controls' was not, although the significant differences could not be observed. In late pregnancy after Period 4, when the rapid development of the pregnant products had occurred, the body weights of bred rats in the placenta group were significantly lower than those of the controls' although both the groups showed a prompt increase in their body weight ($P<0.05$ during Period 4 to 5, $P<0.01$ from the last week of gestation through delivery).

These differences could not be attributed to the intake and the energy consumption of the food or the utilization of dietary protein, but rather might be postulated as owing to that the maternal tissues were intensively catabolized, even initiated soon after the conception, in response to feeding the placenta. This inferrence could be supported further by the fact that there was about 20 gm loss rather than gain in the mean body weight of the mothers through pregnancy in the experimental group (Table 3).

Looking into the effects on the puerperal performance, there could not be found any differences on the viable size and the mean birth weight of the pups between the two group (Table 3). Thus, the efficiency of the placenta diet for the reproduction was evidently as good as that of the control's. Actually, from the urinary urea/total nitrogen ratios (Table 3), there were found no significant differences between the ratios of the two diet groups except that of Period 6. It might be shown that both of the dietary proteins were comparably utilized for the maternal nutrition, principally related to the new born weights of the offspring[8].

There should be some factors in the placenta to induce such an unfavorable result as loss in body weights of the bred rats. However, it could not be elucidated at the

Table 2. The Urinary Excretion of Nitrogenous Products and an Index of Maternal Protein Nutrition in Bred Rats fed on the Different Diets

Nitrogenous Component	Dietary * Group	Period of the Experiment: Before mating 1	Before mating 2	Gestation Period 1	2	3	4	5	6 **	7 **
Urea Nitrogen	P	494.80 ±119.06	495.74 ±135.27	325.39 ±122.47	235.35 ± 63.53	357.54 ± 94.02	366.50 ± 64.69	351.42 ± 58.80	266.23 ± 39.33 #	43.33 ±50.52
	E	534.95 ± 63.63	486.64 ± 48.96	212.66 ± 37.97	86.43 ±36.61 #	67.22 ±29.42 #	104.13 ± 56.56 #	68.98 ±40.63 #	24.06 ±12.88 #	3.82 ±1.54 #
Ammonia Nitrogen	P	37.98 ± 4.89	43.89 ±16.29	28.67 ±10.00	18.71 ± 4.83	18.93 ± 2.18	15.59 ± 2.49	15.84 ± 5.48	15.04 ± 5.73 #	10.69 ± 4.18 #
	E	34.71 ± 3.41	34.71 ± 4.24	34.22 ± 4.11	29.93 ± 5.55 #	26.90 ± 5.92 #	23.01 ± 7.25	22.75 ± 6.68	26.70 ± 5.13 #	15.98 ± 2.85 #
Creatine	P	2.57 ±1.91	3.05 ± 1.74	5.46 ± 2.56	6.35 ±4.83	7.45 ±5.50	8.57 ±5.06	15.00 ± 4.50 #	13.52 ± 2.90 #	12.16 ± 3.49 #
	E	1.28 ±0.69	2.82 ± 1.00	4.09 ±0.97	4.55 ±1.94	4.18 ±2.62	4.21 ±1.44	5.65 ±2.64	5.58 ±2.34	3.46 ±0.63
Creatinine	P	13.21 ± 2.26	13.38 ± 1.18	15.83 ± 1.45	15.72 ± 1.52	16.19 ± 1.27	16.92 ± 1.60	16.64 ± 1.74	14.46 ± 2.38	11.11 ± 2.80
	E	13.61 ± 2.01	13.01 ± 1.34	15.05 ± 1.38	14.70 ± 0.59	13.89 ± 0.95 #	14.84 ± 1.66 #	14.41 ± 0.66 #	12.94 ± 0.50	9.50 ±2.25
Total Nitrogen	P	636.67 ± 82.35	640.32 ± 73.23	732.84 ± 88.28	724.58 ± 91.46	766.83 ±113.16	761.49 ±133.11	774.62 ±108.17	620.39 ±136.38	452.29 ± 55.60
	E	660.03 ± 54.40	618.76 ±100.60	565.97 ± 61.76 #	509.66 ± 49.42 #	452.62 ± 33.90 #	468.49 ± 46.00 #	446.46 ± 28.06 #	375.33 ± 50.51 #	222.69 ± 19.23 #
% of Urea/Total Nitrogen	P	79.4 ± 9.3	76.7 ±14.8	44.9 ±10.9	32.2 ± 6.4	47.1 ±12.4	48.7 ± 8.4	45.7 ± 7.1	43.6 ± 5.1	8.9 ±7.1
	E	81.0 ± 6.8	79.6 ± 9.0	37.7 ± 6.7	17.0 ± 6.9	14.7 ± 5.9	21.8 ±11.5	15.6 ± 9.8	6.2 ±3.4 #	1.8 ±0.8 #

Values in the table represented Mean ± S.D., in mg/Collected Urine/3 days. except those of Urea/Total Nitrogen ratios presented as percent.

* P= The placenta diet. E=The egg volk diet.

** The data of the uncompletely maintained bred rats were not involved in the calculation.

Differences between values for the placenta and the egg yolk group were significant.

Table 3. Change in Body weight and Effect on Reproductive Performance in Rats with the Different Dietary Treatments *

Treatments	Average Body weight in gm during					Maternal Body weight ** (gm)	Viable Litter Size***	Fetus weight ***	
	Before mating	Gestational Period						Total (gm)	Mean
		1st	4th **	6th **	7th **				
with placenta	234.0 ± 24.2	245.1 ± 20.7	238.1 ± 22.5	247.9 ± 22.9	267.7 ± 32.4	218.2 ± 25.0	10.2 ± 2.3	50.36 ±14.07	4.94 ±0.61
with egg-yolk	242.3 ± 9.8	253.8 ± 8.4	261.8 ± 10.9	280.4 ± 15.0	308.8 ± 25.1	267.8 ± 16.6	10.0 ± 4.4	49.30 ±20.62	4.93 ±0.64

* Values represent Means ± S.D.

** Differences between values for both groups were significant.

*** Those could not be observed due to the resorption of the fetuses were omitted.

level of the present study. But, while we calculated from the experimental design on the Bamji's report[2], it was noted that there would be about 1.92 μg of the estrogenic steroids which were contained in the daily amount of the placenta diet to be consumed by the tested rats. Is this a possible factor or are there other factors to be considered ? The experiment should be further studied.

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粗製胎盤粉末當蛋白源飼育妊娠母鼠效果的探討

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摘　要

在糧食生產貧乏的地區，人類的產後胎盤曾被當作蛋白源來飼養家禽牲畜而被報告爲甚具蛋白利用價值。惟其實驗對象局限於年青雄性鼠群的發育上，本報告欲探明其被利用於實驗動物之妊娠與繁殖上當飼料蛋白源的效果。

在與雞蛋黃對照並限制母鼠體妊娠過程中同等量食物攝取的條件狀況下，發現以未經任何預先處理之乾胎盤粉飼養時，孕鼠妊娠過程中排出較大量的尿氮素、尿素、肌肝酸及肌肝酸酐等尿中蛋白代謝產物，而且母鼠體孕期及產後的平均體重均有顯著的減低現象，但是並未影響到子鼠的產數及其出生體重，更就尿素與尿中總氮素的比值觀察上兩組也無甚明顯的差異。本文曾予討論其應用的可能性。