A Critical Analysis of the Diets of Chronic Juvenile Offenders: Part 2

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A study was conducted to evaluate the diets of two groups of juveniles: first, a group of chronic offenders located in either the Pierce County or King County, Washington, juvenile court system; secondly, a group of matched controls selected from a population of moderately to severely behaviorally disordered students in the Tacoma Public School system (Schauss and Simonsen, 1979). Initial analysis of the data revealed that there is a significant difference between the quantity of pasteurized/homogenized cow's milk consumed by the two groups. This was an unexpected finding. A further analysis of the data now suggests other differences in the two groups warranting investigation.

Table 1 lists the nutritional data of the two groups.

Examination of the data demonstrates that the delinquent group is receiving considerably more micro-nutrients and macro-nutrients than the non-offender control group. If, however, calculations are made of the amount of micro-nutrients per 1000 calories for each group, it is found that in general the delinquent group consumes 20 to 25 percent fewer micro-nutrients per 1000 calories than the control group, strongly indicating the need for examining the potential malnutrition of over-consumption and under-nutrition of the delinquent group as it relates to their inability to effectively process the calorie intake.

Part 1 of this study indicated that offenders consumed large quantities of milk in comparison to non-offender controls. This may be a sign of compulsive eating behavior which contributes to a nutritionally induced chemical exacerbation of a pre-disposition to anti-social behavior.

It is difficult to determine from the available data whether the delinquent group's dietary differences cause their behavior

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TABLE 1

NUTRITIONAL DATA

Vitamins

	RDA	Controls N=22(Males) Ave.	Delinquents N=22(Males) Ave.
Vitamin A (I.U.)	5000	35,742	8,577
Vitamin A (R.E.)	1000	2,156	2,425
Vitamin E (I.U.)	12	15.4	18.0
Vitamin D (I.U.)	400	443	861
Vitamin K (mcg)	Not est.	404	509
Thiamin/B_1 (mg)	1.4	1.8	2.54
Riboflavin/B_2 (mg)	1.7	3.2	5.14
Niacin/B_3 (mg)	18.2	28.7	35.7
Pyridoxine/B_6 (mg)	1.6	2.5	3.2
Pantothenic Acid (mg)	5-10	13.4	20
PABA (mg)	Not est.	16.6	27.3
Folic Acid (mcg)	400	214	252
Vitamin B_{12} (mcg)	3.0	9.3	10.4
Biotin (mcg)	Not est	93.4	128
Choline (mg)	Not est.	653	825
Inositol (mg)	Not est.	714	805
Pangamic Acid (mg)	Not est.	13.8	22
Vitamin C (mg)	45	152	203
Bioflavonoids (mg)	Not est.	16.8	12.6

Minerals

	RDA	Controls Ave.	Delinquents Ave.
Calcium (mg)	1200	2380	2916
Magnesium (mg)	350	388	588
Phosphorous (mg)	1200	2286	3506
Sodium (g)	Not est.	4.9	5.3
Potassium (g)	2.5	4.5	6
Iron (mg)	18	20	22.7
Copper (mg)	2-5	2.5	3
Manganese (mg)	2.5-5	2.8	3.5
Zinc (mg)	15	19.7	34
Chromium (mcg)	50-200	220	227
Selenium (mcg)	50-200	128	185
Iodine (mcg)	130	224	252
Nickel (mcg)	Not est.	279	320
Molybdenum (mcg)	Not est.	143	178
Vanadium (mcg)	Not est.	63	47
Significant Ratios:			
Calcium: Phosphorous	1.0	1.0	.83
Calcium: Magnesium	2.3-4.0	6.13	4.96
Sodium: Potassium	1.0-3.0	1.1	.88
Zinc: Copper	7.5	7.85	11.21

Acid Alkaline

	RDA	Controls Ave.	Delinquents Ave.
Acid Ash		52%	49%
Alkaline Ash		48%	51%

Essential Amino Acids

	RDA	Controls Ave.	Delinquents Ave.
Tryptophan	245	1492	2246
Phenylalanine	1350	5563	8483
Leucine	2577	10068	15236
Isoleucine	1718	6458	9683
Lysine	2700	8712	12905
Valine	1534	6827	10380
Methionine	1350	2828	4058
Threonine	1718	5257	7973

Fats

	RDA	Controls Ave.	Delinquents Ave.
Cholesterol	Not est.	644	840
Saturated Fatty Acids	Not est.	106	97
-Linoleic Acid (Vit K)	3-6	15	19
-Oleic Acid	Not est.	51	70
Unsaturated Fatty Acids	Not est.	66	89

TABLE 1

Food Analysis

	RDA	Ave.	Ave.
Calories/Kcal.		3,426	4,703
Carbohydrates/g		376	507
-refined/%		65.5	62.1
-unrefined/%		34.6	37.9
Protein/g		128	183
Fat/g		165	217
-% calories from fat		43	42
Dietary Fiber/g		19.7	23.5
Food Guide			
(Daily Servings)			
Dairy Products		4.3	7.9
Protein Foods:			
-animal sources		2.7	3.2
-legumes, nuts		.33	.57
Fruits and Vegetables:			
-Vitamin C-rich		.73	.68
-dark green		.27	.25
-other		2.23	2.11
Whole Grain Products		.68	.99
Fats and Oils		1.23	1.41
SUGAR (tsp.) (hidden in food and beverages)		28.7	38

problems or whether their diets were a result of preexisting compulsive behavior patterns. Compulsion is defined as an insistent, inappropriate and repetitious overt motor act. It should be pointed out that the dietary differences can only be associated with differences between the two groups and no definitive cause and effect relationship has yet been demonstrated between diet and criminal behavior. However, certain of the differences strongly suggest the need to explore these relationships as possible causal links. These differences suggest future directions of research that could delineate the presence or absence of dietary causal associations in behavior abnormalities.

Data Analysis

Due to the large volume of milk consumed by the delinquent group (x=64.7 ounces for males, x=35 ounces for females), the protein intake is very high (183 grams) compared to controls (128 grams). This contributes to not only general protein excesses, but also due to the unique composition of milk, the alteration of essential amino acid ratios, high milk intake can cause an alteration of the intake of branched versus unbranched amino acids.

It is known from the studies of Wurtman et al. (1974), that branched amino acids such as valine and isoleucine block the uptake of tryptophan and phenylaline at the blood brain barrier altering the balance of these neurotransmitter precursers in the brain thus potentially altering behavior. The implication of this clinically may be to displace critical equilibria involved in the normalization of neurotransmitter synthesis and activity of energy producing cytochromes.

It is well known that high protein dietary intake can produce malabsorption syndrome and a hyperproliferation of indoxyl producing bacteria in the colon with the result being auto-intoxication. It might be useful in future studies to determine the level of urinary indican output of the delinquent versus non-offender group as a measure of this auto-intoxication problem.

The consumption of the demonstrated high quantities of milk protein casein coupled with the demonstrated relative per 1000 calorie vitamin B6 deficiency of the delinquent group may contribute to hepatic related ammonia intoxication and chronic central nervous system dysfunction. The measurement of blood ammonia and erythrocyte GOT levels would need to be run to determine the relative B6 adequacy in relation to ammonia induced en-cephalopathy.

Delinquent diets were also found to be excessively rich in zinc and low in copper. If the absorption of these minerals from the food were similar, the high dietary ratio found of 11.2 to 1 (optimal 7.5 to 1) would potentially contribute to copper metaloenzyme deficiency by displacement.

The significant differences in food preferences between the two groups exhibited by the high milk intake by delinquents suggest that food allergy may contribute as yet an unidentified amount to the observed differences between the two groups. Cytotoxic tests could be used to evaluate this possibility further. Whether an actual allergy is operating or the delinquents are having a pharmacological reaction is difficult to determine. Recent work by Feingold associations has revealed the presence of either BHT or BHA (antioxidative preservatives) in the fortified vitamin D2 or D3 found in pasteurized/homogenized cow's milk. The effect of BHT or BHA on certain children's and adults' behavior has been reported.

The effect of calcium and phosphorous on the metabolism of lead also needs to be investigated. Lederer reported in the Journal of the American Medical Association (1940), as have Six and Coyer (1970) and Quarterman et al. (1973), on the influence of dietary calcium and phosphorous on lead retention in growing children. High vitamin D intakes have also been suggested as facilitating lead absorption in children. Hair tissue mineral analysis of delinquents for lead toxicity seems warranted. This is especially important in light of the Needleman et al. (1979) report in the New England Journal of Medicine that even sub-toxic levels of lead in children were statistically correlated in observed behavioral deterioration and poorer learning performances.

The most important feature of this study is the statistically significant differences in total calorie protein and milk protein/milk sugar intake between the two groups. The importance of these differences as they relate to behavior remains to be delineated in future studies. When considering the reported 38 teaspoons of hidden sugar in the diets of the offender group and adding an unknown quantity of milk sugar (lactose) the high sugar consumption becomes more suspect as a variable for investigation. Also worthy of further investigation would be the observed behavioral differences among the delinquent group when provided either whole unfortified pasteurized homogenized milk, whole fortified pasteurized homogenized milk, certified raw unfortified milk, and two percent low fat milk.

Summary

Review of dietary data from the two groups indicates some statistically significant differences. It should be pointed out that the dietary differences can only be associated with differences between the two groups. No definitive cause and effect relationship has as yet been demonstrated between criminal behavior and diet. Several biochemical mechanisms have been suggested for further studies.

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