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A Supplementary Study on the Maternal Depletion and Child Malnutrition in Certain Underprivileged Rural Area of Korea

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INTRODUCTION

The importance and necessity of the maternal and child health is fully recognized, particularly in terms of their nutritional status. The pregnant and lactating women necessitate far more and better nutrition than ordinary times for not only their own survival and health maintenance but also growth and development of their fetus and children(Kim, 1967). In spite of this fact, however, it is reported that the nutritional status of pregnant and lactating women is retarded in most developing countries(W.H.O., 1965). On the other hand, infants and children fall under the requisite supply of various nutrients particularly protein. Nevertheless, ignorance, poverty and deficiency of available weaning food are obliged to take the irrational food-stuffs (Jelliffe et al., 1967; Kim, 1967; Choo, 1968). In developing countries like Korea, the major cause of death of infants and children are malnutrition and various infectious diseases, and it was confirmed that these displayed interactions(Scrimshaw et al., 1959; French, 1967).

Women in certain underprivileged rural area of Korea are submitted to the overloaded work using unconvenient and inefficient farming tools (School of Public Health, S.N.U., 1964; Phillips, 1954) and their majority ages of adult are allotted for the continuing period of reproduction as the period of gestation and delayed ablactation repeats incessantly(Gopalan and Belvady, 1961). It is expected, therefore, to drive the grave situation against nutritional problem in the maternal and child health. Followingly, if nutritional consumptions accumulate successively, the maternal depletion syndrome develops (Jelliffe and Maddocks, 1964). In the mental and physical development of human life the decisive stage is the period from fetus to three years after delivery, and during this period nutritional status from per-placenta and quality of weaning food influence to the developmental feature of mind and body (Scrimshaw, 1967; Chaw et al., 1968).

Kang et al.(1968) reported the protein-calorie malnutrition study in rural villages, and Choi et al.(1973) presented a paper on the maternal depletion syndrome in rural villages. Both of study limited location deviately and sample size was small. Author has been trying to get the wide picture for the maternal and child health centered into the nutritional deterioration. A supplementary study was undertaken by author from May to July, 1975 the nutritional status with possible reference to maternal depletion syndrome and protein-calorie malnutrition of infants and toddlers in certain underprivileged rural areas of Korea.

PRELIMINARY SURVEY

The preliminary survey was performed for

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Table 1. Objects of Study

	Status		Number	Age(yrs.)±S.D.	Duration(mos.) of the present status
Women	Pregnant		64	29.13 ± 4.12	5.32 ± 2.22
	Lactating		150	31.27 ± 5.43	17.45 ± 1.14
	Total		214	29.90 ± 5.66	

	Age(mos.) / Sex		0~2	3~5	6~8	9~11	12	13~15	16~18	19~23	24~35	36~47	Total
Children	Number	M	5	8	7	8	5	7	12	12	30	36	130
		F	9	9	14	5	7	11	10	20	29	31	145

the area selection of study, the acquisition of cooperation with various organization and personnel related and the collection of basic materials during one month from 10th March, 1975.

OBJECTS OF STUDY

Study areas were selected on the point of underprivilegement both educational and economical. One area was Kangwon Province and the other Kyunggi Province and former set four villages, latter six.

The number of study materials was 64 of pregnant and 150 of lactating totaling 214 women, and 130 of male and 145 of female totaling 275 infants and toddlers(0~47 months). The average age of pregnant and lactating women, average duration of gestation and average age (mos.) of the breast-feeder were shown in Table 1.

FIELD INVESTIGATION

The members for the field investigation were 3 physicians including author, 2 nurses, 2 aid-nurses, 4 investigators and 1 biochemical technician, and among them 1 nurse, 2 investigators and 2 aid-nurses were the local natives who were familiar with local situation.

Immediate after arrival on the local field those members visited each household of villages making confirmation of entity and list of study objects for pregnant and lactating women, and infants and toddlers. Recognition and agreement for the purpose of this study were pursued and promise for time and place selected was given. Thus total number of women for the study was 283 and infants and toddlers 357, however, actual number for the study performed was 64 out of 82 pregnants agreed, 150 out of 201 lactatings agreed and 130 of male out of 171 agreed, 145 of female out of 186 agreed children. Following to the selection of samples, the principal investigation was carried out during 5 days long from 12th May, and combined clinical services and some gifts were delivered to the field people.

CONTENTS AND METHODS OF INVESTIGATION

1. Clinical observation

For pregnant and lactating women, pale conjunctiva, atrophic tongue papilla, thyrotoxicosis, diminished subcutaneous fat, subcutaneous edema, muscle wastage, keratomalacia etc. were observed which could be applicable to the clinical suggestive signs of protein-calorie m alnutrition, osteomalacia and iron-deficient anemia which could be belonged to the maternal depletion syndrome. For infants and toddlers, clinical observation was performed by D.B. J elliffe's method(1967) e.g. edema, dyspigmented hair,

thin sparse hair, muscle wastage, psychomotor change, moon-face, flacky-paint dermatosis and additionally pale conjunctiva, angulostomatitis, keratomalacia, dehydrate diarrhea etc. as the suggestive signs of protein-calorie malnutrition.

2. Nutritional biometry

For pregnant and lactating women, body-height, body-weight, mid-upper arm circumference, mid-arm skinfold thickness were measured, and for infants and toddlers, besides above items, 2 items of chest circumference and head circumference were added.

The method of measurement was followed by Martin's method(1928).

3. Biochemical tests

1) Hemoglobin: Beckmann's U-2 Spectrophotometer was used.

2) Serum protein and serum albumin: Both were measured by means of biuret reactions (Gornal et al., 1949).

3) Serum iron content and total serum iron-binding capacity (TIBC): Followed by Ramsay method(1957).

4) Urinary urea-nitrogen/creatinine-nitrogen excretion ratios: The measurement of urea contents was by urease method of Van Slyke(1916) and that of creatinine by Jaffe's reaction(Greenwald, 1928). According to Koning(1966), urinary urea-nitrogen/creatinine-nitrogen excretion ratio could maintain the definite ratio in anytime excreted urine within 24 hours, so that single excreted urine was submitted as specimen.

5) Serume alkaline phosphatase: Followed by Shinowara's method(1942).

RESULTS OF OBSERVATION AND EXAMINATION

1. Clinical observation

A. Observation on maternity

The frequency distribution of various signs belonging to the maternal depletion syndrome was shown in Table 2, and most frequent was diminished subcutaneous fat and next was pale conjunctiva, atrophic tongue papillae in turn. Although thyrotoxicosis, edema, spoon-nail, osteodynia etc. were not found, the prodromal

Table 2. Clinical Assessment (%) for Maternal Depletion Syndrome of Women

Women	Age	No. examined	Pale conj.	Atr. papil.	Dim'd Subcut. fat	Wasted muscle	Vague aches & pain*	Keratomalacia	Etc**	3 or more signs combined
Pregnant	21~25	14	3(21.4)	5(35.7)	7(50.0)	2(14.2)	—	—	2(14.2)	3(21.4)
	26~30	22	14(63.6)	12(54.5)	11(50.0)	6(27.2)	2 (9.0)	—	7(31.8)	6(27.2)
	31~35	16	10(62.5)	14(87.5)	11(68.7)	7(43.7)	1 (6.2)	—	8(50.0)	3(18.7)
	36~40	12	7(58.3)	2(16.6)	9(75.0)	3(25.0)	3(25.0)	1(8.3)	—	3(25.0)
	Total 21~40	64	34(53.1)	33(51.5)	38(59.3)	18(28.1)	6 (9.3)	1(1.5)	17(26.5)	15(23.4)
Lactating	21~25	26	9(34.6)	8(30.7)	7(26.9)	2 (7.6)	3(11.5)	1(3.8)	3(11.5)	2 (7.6)
	26~30	46	18(39.1)	10(21.7)	25(54.3)	5(10.8)	4 (8.6)	2(4.3)	12(20.0)	7(15.2)
	31~35	34	13(38.2)	15(44.1)	11(32.3)	3 (8.8)	5(14.7)	1(2.9)	6(17.6)	7(20.5)
	36~40	30	14(46.6)	12(40.0)	15(50.0)	6(20.0)	3(10.0)	1(3.3)	3(10.0)	9(30.0)
	41~45	14	8(57.1)	7(50.0)	7(50.0)	4(28.5)	1 (7.1)	—	3(21.4)	2(14.2)
	Total 21~45	150	52(34.6)	52(34.6)	65(43.3)	26(17.3)	16(10.6)	5(3.3)	28(18.0)	27(18.0)
Total		214	96(44.8)	84(39.2)	103(48.1)	35(16.3)	21 (9.8)	6(2.8)	40(18.6)	42(19.6)

* Arthralgia, flank pain, back pain, or quadralgia

** Indigestion, headache, dizziness, or tinnitus

symptoms of osteomalacia like arthralgia, flank pain and back pain were found in 10.5% of lactating and 9.3% of pregnant women. Cases accompanied 3 and more were 18.0% of lactating and 23.4% of pregnant women.

B. Observation on Children

The clinical observation on protein-calorie malnutrition of infants and toddlers was shown in Table 3. The most frequent sign was pale conjunctiva (34.5%) and next occupied 22.5% of muscle wastage. Cases accompanied 3 and more signs were 1.4% and nutritional marasmus 4.3%, nevertheless, no kwashiorkor was detected.

2. Nutritional biometry

A. Measurement on maternity

The biometrical data of body-height, body-weight, mid-upper arm circumference and mid-upper arm muscle circumference for women were shown in Table 4, 5, 6, 7 and 8. In all items except skinfold thickness no statistical

Table 3. Clinical Assessment for Protein-Calorie Malnutrition of Children, sexes combined

Age(months)	Number examined	Dyspigmented hair	Thin, sparse hair	Pale conjunctiva	Keratomalacia	Angulostomatitis	Moon face	Flaky-paint dermatosis	Sore, fissure or moist groin rash	Muscle wasting	Edema	Psychomotor change	Diarrhea and other infections	Combination of 3 or more signs	Kwashiorkor	Nutritional marasmus
0～ 3	15	—	1 (6.6)	2 (13.3)	—	—	1 (6.6)	—	1 (6.6)	—	—	—	—	—	—	—
4～ 6	20	1 (5.0)	7 (35.0)	9 (45.0)	—	—	2 (10.0)	1 (5.0)	2 (10.0)	3 (15.0)	—	—	5 (25.0)	—	—	2 (10.0)
7～11	30	3 (10.0)	8 (26.6)	14 (46.6)	—	—	—	2 (6.6)	7 (23.3)	6 (20.0)	—	—	8 (26.6)	—	—	3 (10.0)
0～11	65	4 (6.1)	16 (24.6)	25 (38.4)	—	—	3 (4.6)	3 (4.6)	10 (15.3)	4 (13.8)	—	—	13 (20.0)	—	—	5 (7.6)
12～23	65	12 (18.4)	18 (27.6)	22 (33.8)	—	4 (6.1)	—	—	15 (23.0)	11 (16.9)	1 (1.5)	4 (6.1)	5 (7.6)	2 (3.0)	—	4 (6.1)
24～35	70	11 (15.7)	8 (11.4)	27 (38.5)	1 (1.4)	7 (10.0)	—	1 (1.4)	16 (22.8)	18 (25.7)	1 (1.4)	6 (8.5)	6 (8.5)	2 (2.8)	—	3 (4.2)
36～47	75	17 (22.7)	2 (2.6)	21 (28.0)	1 (1.3)	18 (24.0)	—	1 (1.3)	10 (13.3)	24 (32.0)	—	5 (6.6)	6 (8.0)	—	—	—
Total 12～47	210	40 (19.0)	28 (13.3)	70 (33.3)	2 (0.9)	29 (13.8)	—	2 (0.9)	41 (19.5)	53 (25.2)	2 (0.9)	15 (7.1)	17 (8.0)	4 (1.9)	—	7 (3.3)
Total 00～47	275	44 (16.0)	44 (16.0)	95 (34.5)	2 (0.7)	29 (10.5)	3 (1.0)	5 (1.8)	51 (18.5)	62 (22.5)	2 (0.7)	15 (5.4)	30 (10.9)	4 (1.4)	—	12 (4.3)

Table 4. Body Height (cm) of the Women

Women / Age(yrs.)	Total		Pregnant		Lactating	
	Sample No.	Mean±S.D.	Sample No.	Mean±S.D.	Sample No.	Mean±S.D.
21～25	40	153.68±5.50	14	154.26±4.33	26	153.37±6.13
26～30	68	152.36±4.86	22	152.16±4.54	46	152.00±5.02
31～35	50	151.40±3.99	16	150.16±4.23	34	151.49±3.88
36～40	42	150.54±5.24	12	150.42±5.87	30	150.49±5.00
41～45	14	149.02±5.27	—	— ± —	14	149.02±5.27
Total	214	151.78±4.87	64	151.83±4.66	150	151.68±4.97

Table 5. Body Weight (kg) of the Women

Women / Age(yrs.)	Total		Pregnant		Lactating	
	Sample No.	Mean±S.D.	Sample No.	Mean±S.D.	Sample No.	Mean±S.D.
21~25	40	50.69±4.59	14	51.22±4 82	26	50.41±4.48
26~30	68	49.07±5.74	22	50.16±4.65	46	49.89±6.27
31~35	50	49.07±3.98	16	48.66±4.82	34	49.27±3.59
36~40	42	48.29±4.66	12	49.32±4.18	30	47.87±4.86
41~45	14	48.32±3.29	—	— ± —	14	48.32±3.29
Total	214	48.93±4.74	64	49.85±4.64	150	48.62±4.79

Table 6. Skin Fold Thickness (cm) of the Women

Women / Age(yrs.)	Total		Pregnant		Lactating	
	Sample No.	Mean±S.D.	Sample No.	Mean±S.D.	Sample No.	Mean±S.D.
21~25	40	0.77±0.27	14	0.72±0.24	26	0.80±0.29
26~30	68	0.82±0.22	22	0.69±0.21	46	0.89±0.24
31~35	50	0.84±0.32	16	0.71±0.26	34	0.91±0.36
36~40	42	0.76±0.30	12	0.76±0.27	30	0.76±0.32
41~45	14	0.75±0.29	—	— ± —	14	0.75±0.29
Total	214	0.79±0.27	64	0.71±0.23	150	0.83±0.29

Table 7. Mid-upper Arm Circumference (cm) of the Women

Women / Age(yrs.)	Total		Pregnant		Lactating	
	Sample No.	Mean±S.D.	Sample No.	Mean±S.D.	Sample No.	Mean±S.D.
21~25	40	22.56±1.63	14	21.96±1.11	26	22.89±1.91
26~30	68	22.35±1.46	22	22.33±1.52	46	22.41±1.00
31~35	50	22.66±1.46	16	22.18±1.34	34	22.90±1.48
36~40	42	22.49±1.94	12	22.11±1.78	30	22.65±2.01
41~45	14	22.33±1.51	—	— ± —	14	22.33±1.51
Total	214	22.48±1.58	64	22.13±1.43	150	22.64±1.11

Table 8. Mid-upper Arm Muscle Circumference (cm) of the Women

Women / Age(yrs.)	Total		Pregnant		Lactating	
	Sample No.	Mean±S.D.	Sample No.	Mean±S.D.	Sample No.	Mean±S.D.
21~25	40	20.29±1.07	14	19.97±0.81	26	20.47±1.22
26~30	68	19.89±1.34	22	20.48±0.89	46	19.62±1.56
31~35	50	20.06±1.40	16	20.15±0.91	34	20.03±1.64
36~40	42	20.03±1.23	12	20.23±1.42	30	19.96±1.16
41~45	14	19.98±1.07	—	— ± —	14	19.98±1.07
Total	214	20.08±1.27	64	20.23±0.97	150	20.16±1.37

Table 9. Results of Nutritional Biometry on the Children

Age(mos.)	Sex	No. of children	Height (cm)	Weight (kg)	Chest cir. (cm)	Head cir. (cm)
			Mean±S.D.	Mean±S.D.	Mean±S.D.	Mean±S.D.
0～ 2	M	5	55.85±1.52	4.67±1.81	8.03± 0.67	37.77±0.47
	F	9	53.23±1.12	4.40±1.18	37.12± 0.97	36.23±1.53
3～ 5	M	8	65.85±2.93	5.20±1.59	41.33± 1.42	43.18±1.71
	F	9	61.76±2.83	5.02±1.48	39.75± 1.99	39.98±1.88
6～ 8	M	7	68.53±2.12	6.23±1.89	42.35± 1.65	42.87±1.24
	F	14	65.74±2.04	5.36±1.18	41.95± 1.65	42.31±1.73
9～11	M	8	71.66±9.27	6.59±2.46	44.37± 2.63	44.61±1.91
	F	5	66.89±5.18	5.91±1.84	42.78± 2.12	43.23±1.23
12	M	5	72.68±2.68	6.89±1.34	44.91± 2.66	45.40±1.72
	F	7	68.22±5.05	6.66±2.56	43.23± 2.71	43.88±1.34
13～15	M	7	72.89±3.65	7.21±2.56	45.23± 1.89	45.15±1.72
	F	11	70.21±3.23	6.86±2.88	44.76± 1.42	43.91±1.51
16～18	M	12	74.00±3.34	7.85±2.34	45.91± 1.23	45.89±1.34
	F	10	74.22±5.40	7.23±2.21	44.79± 2.23	44.70±1.56
19～23	M	12	76.65±5.44	8.70±2.01	46.85± 3.03	46.66±1.78
	F	20	74.69±3.35	8.14±2.97	45.66± 2.35	45.49±1.80
24～35	M	30	80.43±5.88	9.78±2.12	48.02±33.12	46.91±1.68
	F	29	79.22±4.99	9.31±2.72	47.70± 2.50	46.23±1.71
36～47	M	36	89.12±5.53	12.37±2.22	50.72± 2.87	48.64±1.44
	F	31	87.33±6.41	11.76±2.32	49.64± 3.05	47.30±1.51

Table 10. Results of Nutritional Biometry on the Children

Age(mos.)	Sex	No. of children	Triceps skinfold thickness (cm)	Mid-upper-arm circumference(cm)	Mid-arm-muscle circumference(cm)*
			Mean±S.D.	Mean±S.D.	Mean±S.D.
0～ 5	M	13	0.88±0.45	13.17±1.33	11.10±0.14
	F	18	0.84±0.41	13.20±1.55	11.32±1.12
6～11	M	15	0.78±0.21	13.81±1.54	11.23±0.86
	F	19	0.80±0.15	13.21±1.23	10.97±1.41
12～17	M	18	0.57±0.25	14.06±1.41	11.76±0.81
	F	22	0.72±0.14	13.91±0.98	11.21±0.88
18～23	M	18	0.76±0.45	14.03±1.23	11.11±1.16
	F	24	0.70±0.20	13.98±1.25	11.41±1.00
24～35	M	30	0.74±0.21	14.09±0.67	11.71±0.76
	F	29	0.72±0.20	14.08±1.12	11.79±0.92
36～47	M	36	0.73±0.56	14.15±1.02	12.28±1.16
	F	31	0.73±0.18	14.11±0.91	11.60±1.17

* Mid-arm-muscle circumference (cm)=Mid-arm circumference-Triceps skin-fold thickness×3.14

significance was found between pregnant and lactating women.

B. Measurement on children

The biometrical data for children were presented in Table 9, e.g. body-height, body-weight, chest circumference and head circumference were listed in the Table. The measurement of triceps skinfold thickness and mid-upper arm circumference for the purpose of computing mid-upper arm muscle circumference which would be used for the assessment of the wastage of muscle were illustrated in Table 10.

3. Biochemical test

1) Hemoglobin levels: Hemoglobin level of women was 12.36 gm% in average and anemic (level less than 10.8 gm%) was 8.3% (6/72), and that of children was 11.80 gm% and anemic 13.0% (16/123) as presented in Table 11.

2) Serum protein and albumin levels: Serum protein level of women was situated within normal range, but 2 cases (3.4%) were under the lower limit of normal range, and that of children showed similar feature with 7 cases (10.1%) of having under lower limit as pres-

Table 11. Hemoglobin Levels (gm%) of the Women and Children

Status, Age(mos.)		No. examined	Mean±S.D.	Cases in 7.1~10.0 gm%	Cases in 10.1~12.0 gm%	Cases over 12gm%	Anemia Level below 10.8gm%*
Women	Pregnant	21	12.57±1.06	1	12	8	2
	Lactating	52	12.47±1.11	2	21	29	4
	Total	73	12.36±1.09	3(4.1%)	33(45.2%)	37(50.6%)	6 (8.3%)
Childrem	0~ 5	11	12.38±1.76	0	3	4	1
	6~11	18	11.87±1.12	0	7	7	2
	12~17	20	11.46±1.03	1	12	5	3
	18~23	22	11.70±1.36	2	11	13	4
	24~35	24	11.57±1.45	2	18	7	3
	36~47	28	11.08±1.36	1	13	17	3
	Total	123	11.80±1.18	6(4.8%)	64(52.0%)	53(43.0%)	16(13.0%)

* Criteria of Anemia Level, WHO Study Group on Iron Deficiency Anemia (1959)

Table 12. Serum Protein Levels (gm%) of the Women and Children

Status, Age(mos.)		Number exam'd.	Mean±S.D.	Cases with the levels below the lower limits of the normal range, 6gm%
Women	Pregnant	23	7.01±0.58	2
	Lactating	35	7.39±0.46	—
	Total	58	7.23±0.05	2 (3.4%)
Children	6~11	5	6.87±0.22	—
	12~17	6	6.92±0.13	—
	13~23	11	7.40±0.62	1
	24~35	23	6.97±0.63	2
	36~47	24	6.86±0.61	4
	Total	69	6.98±0.54	7(10.1%)

Table 13. Serum Albumin Levels (gm%) of the Women and Children

Status, Age(mos.)		No. exam'd	Mean±S.D.	Normal	"Low (2.80~3.51)"	"Deficient (<2.80)"
Women	Pregnant	23	3.70±0.32	10	13(56.5%)	—
	Lactating	35	4.01±0.38	30	5(14.2%)	—
	Total	58	3.88±0.35	40(68.9%)	18(31.0%)	—
Children	6~11	5	4.02±0.32	4	—	—
	12~17	6	3.81±0.62	3	2	—
	18~23	11	3.75±0.63	9	3	—
	24~35	23	3.90±1.11	13	9	—
	36~47	24	3.85±1.10	21	3	—
	Total	69	3.85±0.39	52(75.3%)	17(24.6%)	—

Table 14. Serum Iron & Total Iron Binding Capacity (microgram%) of the Women and Children

Status, Age(mos.)		Serum Iron Levels			Total Iron Binding Capacity			
		No. examined	Mean±S.D.	Deficiency level (<50μg%)	No. examined	Mean±S.D.	Normal range	Low values (<300μg%)
Women	Pregnant	16	87.23±21.77	4(25.0%)	16	310.66±30.88	10(62.5%)	6(37.5%)
	Lactating	30	84.16±19.77	2 (6.6%)	30	383.88±40.11	8(26.6%)	22(73.3%)
	Total	46	35.22±20.46	5(10.8%)	46	293.19±36.89	18(39.4%)	28(60.8%)
Children	6~11	4	56.22±4.38	2	2	363.44±77.04	2	—
	12~17	6	58.14±5.88	3	3	294.56±66.38	2	2
	18~23	10	67.69±9.13	2	7	272.43±43.91	2	4
	24~35	18	73.28±11.18	3	13	291.40±50.53	3	9
	36~47	20	60.18±8.77	9	14	263.14±60.29	1	13
	Total	58	65.05±8.97	19(32.7%)	39	281.78±55.35	10(25.6%)	28(74.3%)

ented in Table 12.

Serum albumin levels were also within normal range both for women and children. Cases situated within lower limit (2.80~3.51 gm%) were 18 (3.0%) in women and 17 (24.6%) in children, and none of deficient limit (under 2.80 gm%) was found in both groups (refer Table 13).

3) Serum iron and total iron binding capacity (TIBC): Serum iron content of women less than 50 μg% was found in 5 cases (10.8%) but that of children was one third (32.7%) depicting lower limit of normal range.

TIBC under 300 μg% was found 3/5 in the rate out of total women examined and 3/4 out of total children examined(refer Table 14).

4) Urinary urea-nitrogen/creatinine-nitrogen ratio: "Urinary urea-nitrogen/creatinine-nitrogen excretion ratios" regarded as an approximate index of dietary adequancy obtained as presented in Table 15.

The average urea-nitrogen content was 2.89 gm/L in women and 2.67 gm/L in children. The average creatinine-nitrogen content was 0.18 gm/L in women and 0.12 gm/L in children. The cases with ratio "30 or less" rated 73.3% of total 45 women examined and 58.0 % of total 62 children examined.

Table 15. Urinary Urea-Nitrogen/Creatinine-Nitrogen Ratio of the Women and Children

Status, Age(mos.)		No. examined*	Urea-N(gm/L)	Creatinine-N (gm/L)	Urea-N** / Creatinine-N	Cases with Ratio 30 or below***
			Mean±S.D.	Mean±S.D.	Mean±S.D.	
Women	Pregnant	20	2.51±0.98	0.18±0.08	21.34± 7.48	17(85.0%)
	Lactating	25	3.21±1.02	0.17±0.09	26.22± 4.31	16(64.0%)
	Total	45	2.89±1.00	0.18±0.08	24.05± 5.71	33(73.3%)
Children	6~11	6	2.37±0.51	0.11±0.08	32.14± 4.21	2(33.3%)
	12~17	7	2.72±0.88	0.15±0.07	22.16± 5.34	4(57.1%)
	18~23	13	2.49±0.75	0.12±0.07	26.48±12.63	8(61.5%)
	24~35	18	2.83±1.07	0.13±0.10	25.99±10.09	15(83.33%)
	36~47	18	2.76±0.82	0.13±0.08	31.16± 9.46	7(38.8%)
	Total	62	2.67±0.85	0.12±0.08	27.75± 9.33	36(58.0%)

* Single urine specimens collected just before luncheon time

** This ratio is an approximate index of dietary protein related to muscle protein stores.

*** An index of 30 or lower suggested to be indicative of malnutrition, by Dugdale & Edkins Urinary urea/creatinine ratio in healthy and malnourished children, Lancet, 1 : 1062, 1964.

5) Serum alkaline phosphatase level: Serum alkaline phosphatase level of women examined was within normal range in average, however, from each variable context, 3 cases (1/5) of pregnant and 9 cases (1/4) of lactating women were over the normal range as presented in Table 16.

Table 16. Serum Alkaline Phosphatase Level (Bodansky unit) of the Women

Women	No. examined	Mean±S.D.	Cases with the values over the normal range*
Pregnant	15	3.89±1.23	3
Lactating	22	4.22±1.71	9
Total	37	4.08±1.51	12

* 2.0~4.5 Bodansky unit.

DISCUSSION

1. Clinical Assessment

A. Maternity

1) As to protein-calorie malnutrition(PCM): Protein-calorie malnutrition(PCM) is the most prevalent cause of the maternal depletion syndrome. The prevalent rates of the signs suggesting PCM turned out to be as below; Firstly causes with diminished subcutaneous fat were observed with 59.3% of the pregnants, 43.3% of the lactating women, and 48.1% of the total examined.

Secondly prevalence of muscle wasting rated 28.1% of the pregnants, 17.3% of the lactating women, and 16.3% of the total. Thirdly the severe case with edema was not found. These statuses were more prominent in pregnant.

2) As to iron deficiency anemia: Those who were found to have a pale conjunctiva rated 53.1% of the pregnants, 34.6% of the lactating women, and 44.8% of the total. Rates of those with atrophic tongue papillae were 51.5% of the pregnants, 34.6% of the lactating women, and 39.2% of both groups. The case with koilonychia was not observed. The anemic grade was also more in pregnants.

3) As to osteomalacia: No clinical evidence pertaining to osteomalacia has been detected in this study, but the symptoms such as flank pain, back pain, chest pain, or arthralgia which might be complained by the patient at the

beginning were checked with 9.3% of the pregnants, 10.6% of the lactating women, and 9.8% of the total.

4) Others: Including 6 cases with keratomalacia, those who complained of vertigo, tinnitus, indigestion, headache, or frequent stye were checked with about 18% of the total examined.

This study, regarding the above results, could be discussed by saying that more than half of the women examined had so-called maternal depletion syndrome in mild to moderate degree, and that the older the age of the examined was, the more prominent depletion syndrome was. This pattern of depletion suggested the possible ascription to repeated pregnancy and lactation.

B. Children

Nutritional status of infants and toddlers depends upon the amount of intake of protein or total calorie(French, 1967; Chaw et al., 1968). As effect of lack of protein and calorie intake, protein-calorie malnutrition in mild to severe degree develops and PCM is classified into 2 categories such as kwashiorkor and nutritional marasmus.

Kwashiorkor is encountered in infants and toddlers who take enough total calorie with severe protein deficiency. The commonest clinical signs are edema, growth failure, atrophy of the muscles with localized subcutaneous fat preserved, and psychomotor changes which are pathognomic to the disease. Other signs, which may or may not be present, are change in the pigmentation of the hair, paleness of conjunctivae, moon-face and other evidences of nutritional deficincies, such as angular stomatitis, keratomalacia, skin fissure. A history of diarrhea and some preceding or followed infectious disease may usually be elicited.

As shown in Table 3, those with only one of pathognomic signs of kwashiorkor were observed, but even a case with all signs was not found.

Nutritional marasmus is encountered as the "balanced starvation" which means both intake of calorie and protein are deficient. Usually it is diagnosed clinically with the following commonest signs, such as growth failure(body weight under 60 percentile), and severely wasted musculature with absent subcutaneous fat. In such cases, change in hair is frequently present. Keratomalacia, angular stomatitis and infectious diseases accompanied may not usually be present. Table 3 shows those with above signs related nutritional marasmus rated 4.3% of the total examined. Those corresponding to 30.6% of the whole examined had one or two combined suggestive sign of PCM. Cases with three or more signs combined rated 1.4% of the total children examined.

No clinically obvious kwashiorkor was observed. Only nutritional marasmus was found and rated 4.3% of the total examined. But some children showed each of the component signs which related kwashiorkor such as edema(two cases, 0.7% of the total), atrophy of muscle (22.5%, nutritional marasmus included) and psychomotor changes(5.4% of the total).

The fact that cases with nutritional marasmus were found about two folds in infants and the possibility to manifest as kwashiorkor was more marked in toddlers was concordant with that presented by Scrimshaw(1967).

2. Nutritional Biometry

A. Maternity

1) Height: Range of height of those examined was 141 cm to 169 cm. Considering that mean height of the examined is smaller in 3 cm than that of Nation-wide Survey(Kim, 1956). This fact would be derived from that nutritional deficiency, especially protein deficiency during fetal and childhood may play a important part in growth and development(Scrimshaw, 1967; Chaw, 1968).

Table 17. Weights of the women, showing percentages in four levels underweight for height, ( ) %

Women	No. exam'd.	1st level: 90~81% of standard	2nd level: 80~71% of standard	3rd level: 70~61% of standard	4th level: 60% & below the standard
Pregnant	54	26(48.1)	3(5.5)	1(1.8)	—
Lactating	150	41(27.3)	3(2.0)	1(0.6)	—
Total	204	67(32.8)	6(2.9)	2(0.9)	—

2) Weight: Shown as Table 5, mean weight was 49 kg and it was also less than Korean General Standard in about 4 kg. Standard weight for adult was obtained from the ICNNDs' data "Weight for Height"(1963).

In pregnant women, that weight gain during pregnancy(from conception to delivery) is less than 10% of the body weight at conception is regarded as the indicator of protein-calorie malnutrition(Jelliffe et al., 1967). So to determine PCM of the pregnant women, serial check of body weight is recommended. But in the present study body weight of pregnant women checked one time is compared to the ICNNDs' data(1963) modified with adding ideal weight gain during pregnancy. Body weight of lactating women checked one time is compared to ICNNDs' data directly.

The data of body weight of pregnant women in this study was shown in Table 17. 26 out of 54 cases (48.1%) were in 90~81% and three cases(5.5%) were in 80~71%. Only one case (1.8%) was in 70~61%. No case was found under 60%. It is considered that more than half of pregnant women examined were found to be affected with mild to moderate PCM, but no severe case of PCM likewise with the lactating women was observed.

Although pregnant women were not severely affected with PCM, proportion of under-weight in pregnant women was more than in lactating women. It is considered that mild to moderate PCM affected to weight gain during pregnancy(Jelliffe et al., 1967).

Table 17 revealed 41 cases of 150 lactating women examined(27.3%) in 90~81%, three cases(2.0%) in 80~71% and only one case (0.6%) in 70~61%. The other 105 cases(70.1%) were in 91% and more. It is considered that about one third of lactating women examined were found to be affected with mild to moderate PCM(Table 18).

Table 18. Women(%) with Protein Calorie Malnutrition

Women	No. examined	Mild to moderate PCM 90~61% level underweights	Severe PCM
Pregnant	54	30(55.5)	—
Lactating	150	45(30.0)	—
Total	204	75(37.2)	—

3) Triceps skinfold thickness, upper mid-arm circumference, and upper mid-arm muscle circumference: Shown in Table 6, mean triceps skinfold thickness was average 0.79 cm. Significant difference between pregnant and lactating women was present.

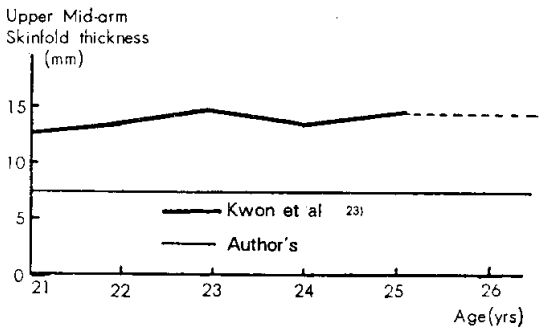

Fig. 1. Comparison of the skin fold thickness.

Compared to the Kwon's report(1968), this

Table 19. Heights of the Children, showing percentages in four levels underheight for age, sexes combined, ( ) %

Age(mos.)	No. examined	1st level 90~81% standard		2nd level 80~71% standard		3rd level 70~61% standard		4th level 60 & below standard	
		General	Rural	General	Rural	General	Rural	General	Rural
0~ 3	15	2(13.3)	1(6.6)	—	—	—	—	—	—
4~ 6	20	1 (5.0)	1(5.0)	—	—	—	—	—	—
7~11	30	2 (6.6)	1(3.3)	—	—	2(6.6)	1(3.3)	—	—
Total 0~11	65	5 (7.6)	3(4.6)	—	—	—	1(1.5)	—	—
12~23	65	7(10.8)	7(10.8)	—	—	2(3.0)	—	—	—
24~35	70	9(12.8)	5(7.1)	—	1(1.4)	2(2.8)	—	—	—
36~47	75	6 (8.0)	5(6.6)	1(1.3)	—	—	—	—	—
Total 12~47	210	22(10.4)	17(8.0)	1(1.3)	1(1.4)	2(2.8)	1(1.5)	—	—
Total 0~47	275	27 (9.8)	20(7.2)	1(1.3)	1(1.4)	4(1.4)	2(0.7)	—	—

result is by far lower than that as illustrated in Fig. 1. It is considered that this difference was mainly affected by characteristics of samples examined. At Kwon's data(1968) unmarried college students were sampled and those nutritional status seemed better than that of this study.

Upper mid-arm muscle circumference is regarded as the one of the indicators showing the degree of atrophy of muscle encountered with protein-calorie malnutrition. This index is computed on measuring triceps skinfold thickness and upper mid-arm circumference. Mean upper mid-arm circumference was 22.43 cm and mean upper mid-arm muscle circumference was 20.08 cm. No significant difference was presxent.

B. Children

Regarded that height is not usually affected with PCM(Jelliffe et al., 1967) this present study show a similar result. Distribution of height by 4 levels of 10% intervals was shown in Table 19. Compared to the Korean General Standard, 9.8% of the total examined was in first class(90~81% of the standard), 1.3% in the second class(80~71%), and 1.4% in the third class(70~61%). In the light of Korean rural standard(Korean Society of Pediatrics, 1967), 7.2% in the first class, 1.4% in the second class and 0.7% in the third class. Any case in the 4th class(under 60%) was not observed. Those with height below the standard rated 12.5% as be compared to Korean General Standard(Kim, 1956) and 9.3% when Korean rural standard used.

Until 6-month-olds height of the examined showed similar increasing pattern to the Korean General Standard and Korean Rural Standard. But after 6 months increase in height declined on the standard and became below the standard until they were 30 months old(Refer Fig. 2).

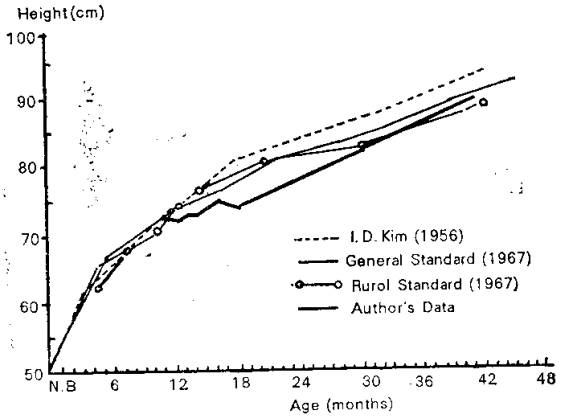

Fig. 2. Comparison of heights of children(males).

2) Weight: Mentioned above, weight of children is largely affected with PCM(Jelliffe et

Table 20. Weights of the Children, showing percentages in four levels underweight for age, sexes combined, ( ) %

Age(most)	No. exam'd	1st level 90~81% of		2nd level 80~71% of		3rd level 70~61% of		4th level 60% & below	
		General standard*	Rural standard*	General standard	Rural standard	General standard	Rural standard	General standard	Rural standard
0~ 3	15					1(66.6)	2(13.3)	4(25.0)	5(33.3)
4~ 6	20	2(10.0)	1 (0.5)	4(20.0)	5(25.1)	2(10.8)	2(10.0)	5(25.0)	4(20.0)
7~11	30	4(13.3)	5(16.6)	5(16.6)	7(23.3)	9(30.0)	5(16.6)	9(30.0)	6(20.0)
Total 0~11	65	6 (9.2)	6 (9.2)	9(13.8)	19(21.5)	12(18.4)	9(13.8)	18(27.6)	15(23.0)
12~23	65	11(16.9)	9(13.8)	10(15.4)	10(15.4)	8(12.3)	10(15.4)	11(16.9)	11(16.9)
24~36	70	16(22.8)	11(15.7)	6 (8.5)	6 (8.5)	12(17.1)	10(14.2)	3 (4.2)	2 (2.8)
36~47	75	15(20.0)	9(12.0)	8(10.6)	7 (9.3)	5 (6.6)	4 (5.3)	2 (2.6)	1 (1.3)
Total 12~47	210	42(20.0)	29(13.8)	24(11.4)	25(11.9)	27(12.8)	24(11.4)	16 (7.6)	14 (6.6)
Total 0~47	275	48(17.4)	35(12.7)	33(12.0)	39(14.1)	39(14.1)	33(12.0)	34(12.3)	29(10.5)

* Referred to the Growth Data of Korean Children, the Korean Pediatric Association and the Ministry of Health and Social Affairs, ROK, 1967

Table 21. Children with protein-Calorie Malnutrition, sexes combined, ( ) %

Age(mos.)	No. examined	Mild-moderate PCM* 90~61% level underweights	Severe PCM: Total cases of 4th level underweight including kwashiorkor and nutritional marasmus
0~ 3	15	2(13.3)	4(26.6)
4~ 6	20	8(40.0)	6(30.0)
7~11	30	17(56.6)	10(33.3)
Total 0~11	65	27(41.5)	20(30.7)
12~23	65	29(44.6)	11(16.9)
24~35	70	33(47.1)	3 (4.2)
36~47	75	28(37.3)	2 (2.6)
Total 12~47	210	90(42.8)	16 (7.6)
Total 0~47	275	117(42.5)	36(13.0)

* Protein-Calorie Malnutrition

al., 1967). So the extent of PCM is estimated with measuring weight and comparing to a certain standard is regarded as one of useful methods. As shown in Table 20, compared to the Korean General Standard, those in the first class rated 17.4%, 12.0% in the second class, 14.7% in the third class and 12.3% in the fourth class. By the criteria Dr. Jelliffe(1967) suggested, mild to moderate PCM cases(in 90~61% of the standard) rated 42.5% of the total children examined without any difference of rate between infants and toddlers, and the severe PCM cases(under 60% of the standard) were comprised 30.7% of the infants, 7.6% of the toddlers and 13.0% of the both groups.

In the light of the above rates, more than a half of the children examined were found to be affected with PCM.(Refer Table 21).

Nutritional status of infants is dependent solely on breast feeding. So a limited supply calorie and frequent diarrhea can be quoted as major problems of under-weight, and then the

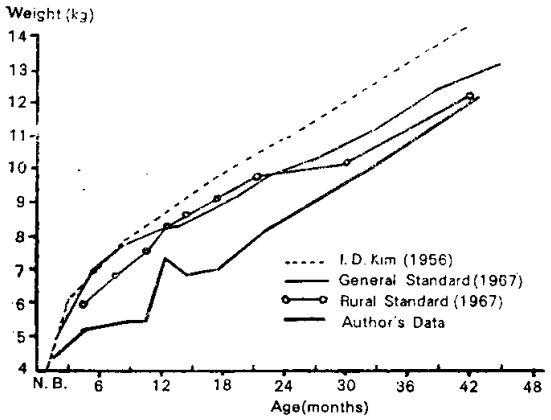

Fig. 3. Comparison of weights of children(females).

underweight in infants is more marked than in toddlers who are able to take sufficient calorie with carbohydrate. Distribution of weights contrasted with standards was shown in Fig. 3.

3) Chest circumference and Head circumference: It is normal finding that chest circumference(C.C.) becomes more than head circumference(H.C.) after the first 6 months of life. But the cases with C.C./H.C. ratio being below 1 after 6-month-olds suggestive of the wasting of pectoral muscles(Jelliffe et al., 1967) with attributable to PCM corresponded to 55.8% of the infants, 25.4% of the toddlers and 30.2% of the total children as shown in Table 22.

Table 22. Chest Circumference/Head Circumference Ratio below 1

Age (months)	Number examined	Cases below 1	Percentage
6~11	34	19	55.8
12~47	208	53	25.4
Total 6~11	242	72	30.2

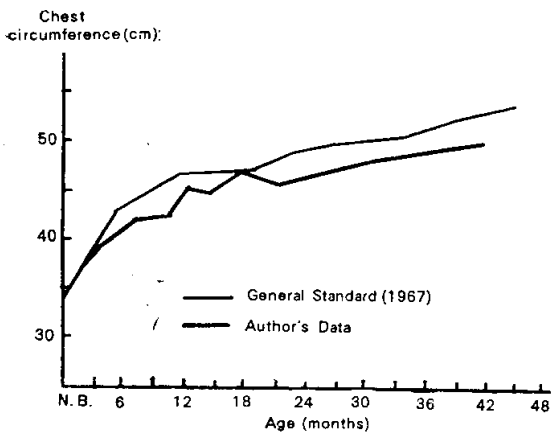

Fig. 4. Comparison of chest circumference(males).

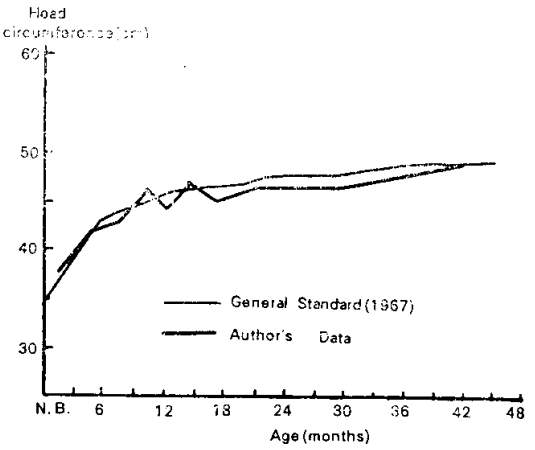

Fig. 5. Comparison of head circumference(females).

Compared to the Korean General Standard, both C.C. and H.C. were less than the former (Table 4 & 5). The distribution pattern of C.C. was similar to that of weight.

4) Triceps skinfold thickness, upper mid-arm circumference and upper mid-arm muscle circumference: Since no report on the Korean General Standard had been present, those were

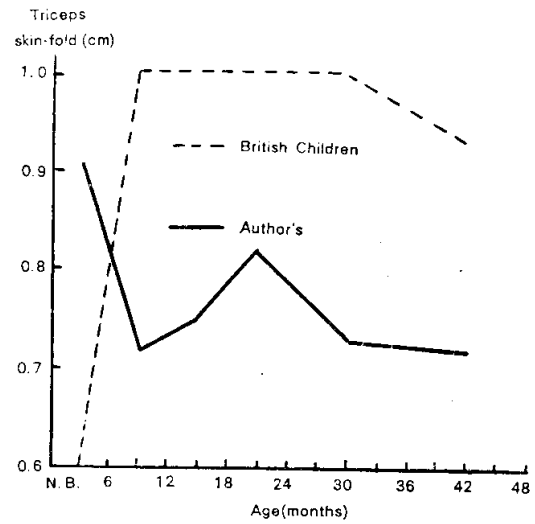

Fig. 6. Comparison of triceps skin-fold(males).

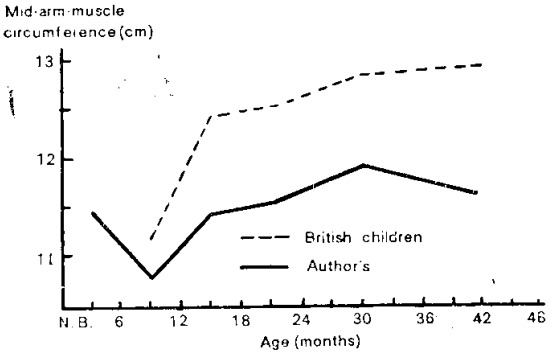

Fig. 7. Comparison of mid arm-mscle circumfarence (females).

compared to the British children standard by Tanner and Whitehouse. Until the first 6 months of life, those of Korean children were larger than the latter. But after the period those of British children became by far larger than Korean children(Fig. 6 & 7).

In male group, relative muscle wasting was seen prominent from 15-month-olds to 3-year-olds, but the other hand, in female group from 6-month-olds to 15-month-olds

3. Biochemical tests

A. Maternity

1) Hemoglobin level, serum iron content and total iron-binding capacity(TIBC): The average hemoglobin level was about 12 gm% and no significant difference between pregnant women and lactating women was present(Table 11). Thirteen cases among 21 pregnant women(61.9 %) were found that their hemoglobin levels were less than 12 gm% and 2 cases were anemic.

If it is taken into account that the hemoglobin levels in pregnancy have a normal physiological fall in level of about 2 gm% due to hemodilution, the results of pregnants as shown in the Table 18 should be interpreted to be normal.

Those with hemoglobin levels below the mean were 23 cases of lactating women and 4 cases of them(7.6% of the total lactating women) were anemic.

Those with serum iron content less than 50 μg% were observed with 4 cases of 16 pregnant women.

On the whole values of TIBC of pregnant women were within normal limit, but the other hand, those of lactating women were below the normal range. Those corresponding to 62.5% of the pregnant women and 26.6% of the lactating women had TIBC within normal limit. Those with TIBC below the normal range rated 37.5% of the former and 73.3% of the latter. The fact that in the majority of the cases serum iron content was within normal limit, but the other hand, more than 60% of the total examined had values of TIBC below the normal range(300 μg%) indicated the possible ascription to chronic protein deficiency(Person, 1966).

2) Serum total protein and serum albumin: In general, they are less affected against the mild to moderate PCM. No case with deficient level of serum total protein was found(Table 12). As shown in Table 13, level of serum albumin was grossly within normal limit, but the levels turned to be low(2.80~3.51 gm%) with 13 cases of 23 pregnant women(56.5%), 5 cases of 35 lactating women examined(14.2%) and 31.0% of the total examined. No case with deficient level of serum albumin(below 2.80 gm%) was found.

3) Urinary urea-nitrogen/creatinine-nitrogen excretion ratio: This ratio is adapted as an indicator presenting dietary adequancy of protein and "30 or below" indicates malnutrition (Dugdale and Edkins, 1964). The percentages of women below 30 was 85.0% of the pregnant women, 64.0% of the lactating women and 73.3% of the total examined.

4) Serum alkaline phosphatase levels(SAP): The mean levels were within normal limits except several cases(3 cases of pregnant women, 9 cases of the lactating women) exceeding the normal range. Since the levels of SAP in pregnancy have a normal physiological increase

and become over 20 units(Bodansky) near the term(Meade and Rosalki, 1963), some pregnant cases exceeding the normal range had no significant meaning.

The fact that some lactating women had SAP levels above the normal range was regarded as the result of deficiency of calcium or phosphorus due to vitamin D deficiency, failure of calcium intake, or poor intake of phosphorus.

B. Children

1) Hemoglobin levels, serum iron content and total iron binding capacity(TIBC): Hemoglobin levels were found to be anemic(less than 10.8 μg%) with 13.0% of the total children examined. Those with serum iron content below the normal range rated 32.7%. Those corresponding to 74.3% of the total examined had TIBC less than 300 μg% and no exceeded over the range of normality.

TIBC falls as the result of chronic protein deficiency but the other hand, it increases at iron deficient anemia(Person, 1966). The fact mentioned above suggested possible ascription to chronic protein deficiency. As the result of chronic protein deficiency TIBC would fall.

2) Serum total protein and serum albumin: Although serum total protein level is affected markedly with kwashiorkor, the synthesis of albumin is affected at relatively late stage. So the first manifest of protein deficiency is found as the muscle wasting. And then, measuring the level of serum total protein or serum albumin is regarded not useful to evaluate mild to moderate PCM.

3) Urinary urea-nitrogen/creatinine-nitrogen excretion ratio: This ratio represents the adequacy of foods related to the deposits of muscle protein, and if the ratio becomes under 30 it can be denoted as malnutrition as presented by Dugdale and Edkins(1964), and it is reported by Arrogane that the ratio falls down particularly as in the intake of protein deficient food. Children below 30 was 58.0% of the total children examined and then the majority of them were toddlers.

SUMMARY AND CONCLUSION

In order to assess the nutritional status with possible references to the maternal depletion for pregnant and lactating women, and the protein-calorie malnutrition for infants and toddlers in certain underprivileged rural villages of Korea by employing such methods as clinical assessment, nutritional biometry and biochemical tests, studies were undertaken by author in May 1975.

The women examined totaled 214 of whom 64 were pregnants and 150 were lactatings. The children examined totaled 275 of whom 130 were boys and 145 were girls.

The results obtained were as follows:

I. As to the maternal depletion syndrome for women;

1. Clinical assessment

1) The prevalence of diminished subcutaneous fat, muscle wastage and edema(not detected) as signs of protein-calorie malnutrition was demonstrated in Table 2. Thus pregnants depleted more than lactatings in the protein calorie.

2) The prevalence of atrophic tongue papillae and koilonycia(not found) as clinical features of iron deficient anemia was also presented in the Table 2. Here also the anemic tendency appeared more in pregnants.

3) Osteodynia as the clinical symptom of osteomalacia was not found but flank-, back-, chest- and joint-pain complaining at the beginning of disease were confirmed.

From above clinical observation, half and more women sampled possessed the depletional disposition, and it tended more in pregnants and the aged the more.

2. Nutritional biometry

1) Although body-height was not concerned directly with the maternal depletion syndrome, shorter height as seen in Table 4 seemed that they had not had adquate nutrition in fetal and child stage.

2) Average body-weight of pregnant and lactating women was shown in Table 5. Weight of women which compared each variate of measurement with ICCND's weight for height and classified into Jelliffe's four level underweight for height were shown in Table 17, e.g. one third (30.0%) of lactating women were belonged to underweight of 90~61% of the standard, relevant to mild and moderate protein-calorie malnutrition, and over half (55.5%) of pregnant women were underweight indicating mild and moderate protein-calorie malnutrition. This would be said more frequent in pregnants than in lactatings.

3) Skinfold thickness, mid-upper arm circumference and mid-upper arm muscle of women were presented in Table 6, 7 and 8. Significant difference between pregnant and lactating women was seen in the skinfold thickness showing less in pregnant, however, no significant difference was found in the mid-upper arm muscle circumference.

From above data both pregnant and lactating women were fallen into protein-calorie malnutrition, particularly in pregnants.

3. Biochemical tests

1) Hemoglobin level and serum iron content and TIBC were presented in Table 11 and 14. Those values would derive from the chronic protein deficiency.

2) Serum protein and albumin levels were presented in Table 12 and 13, e.g. serum protein level was within normal range but serum albumin level was under it rated 1/3(31.6%).

3) Urinary urea-nitrogen/creatinine-nitrogen ratio was listed in Table 15, showing 73.3% of ratio 30 or less.

4) Serum alkaline phosphatase level was shown in Table 16.

From above data, both pregnant and lactating women seem to be affected the chronic iron deficient anemia and protein deficient state.

II. As to the protein-caloric malnutrition for children

1. Clinical assessment

The prevalence of hair dyspigmented and sparse, pale conjunctiva, keratomalacia, angulostomatitis, moon-face, flacky-paint dermatosis, sore, fissure or moist grain rash, muscle wastage, edema, psychomotor change and diarrhea and other infection as the suggestive signs of protein-calorie malnutrition were demonstrated in Table 3.

From the above data summarized, the following findings could be led; (1) No clinically obvious kwashiorkor was found, however, each of the component signs which, in constant combination, characterized it (edema, muscle wastage and psychomotor change) was seperately observed mainly with toddlers. (2) Those clinically obvious nutritional marasmus were 7.6% of infants and 3.3% of toddlers.

2. Nutritional biometry

1) The mean body-height, body-weight, chest circumference and head circumference measured were as shown in Table 9.

2) The mean triceps skinfold thickness, upper mid-arm circumference and upper mid-arm muscle circumference were shown in Table 10.

3) Distribution of heights by four levels of 10% intervals indicated underweights in the height of Korean general standard were shown in Table 19.

4) Distribution of the weights contrasted likewise with Korean general standard were shown in Table 20.

5) The pattern of protein-calorie malnutrition demonstrated by underweights at four levels of 10% intervals as against Korean general standard was demonstrated in Table 21.

6) The cases with "Chest circumference/Head circumference Ratio being below 1 after the first 6 months of life" were shown in Table 22. This ratio being below 1 could be suggestive of the wasting of pectoral muscle.

In the light of the above data, more than a half of children examined were found to be affected with protein-calorie malnutrition ascribable to deficiency of both protein and calorie.

3. Biochemical tests

1) Hemoglobin level and serum iron content and TIBC were presented in Table 11 and 14. The low value of hemoglobin and serum iron content suggested the possible ascription to chronic protein deficiency in spite of exceeding of TIBC over the normal range.

2) Serum protein and albumin levels were as shown in Table 12 and 13. This denoted that both levels were generally fallen into the normal range.

3) Urinary urea-nitrogen/creatinine-nitrogen ratio was listed in Table 15 showing 58.0% of ratio 30 or below.

Those data of above description suggested the affection of malnutrition related to dietary adequacy of protein.

≫國 文 抄 錄≪

우리나라 落後地域에 있어서 母性消耗와 嬰幼兒營養失調에 關한 硏究補遺

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著者는 우리나라 一部 落後地域에 있어서 있음직 하는 妊娠婦 및 授乳婦의 母性消耗症候群과 嬰幼兒의 蛋白칼로리 營養失調에 關한 營養狀態을 調査 補遺하고저 1975年 3月부터 同年 5月까지 妊娠婦 64名, 授乳婦 150名 그리고 嬰幼兒 275名에 對한 臨床觀察, 身體營養計測 및 生化學的檢査에 關한 調査를 하여 다음과 같은 結果를 얻었다.

Ⅰ. 妊娠·授乳婦의 母性消耗症候群에 關하여

1. 臨床的 觀察

觀察對象婦人의 過半數가 母性消耗症候의 素因을 가지고 있었으며 特히 妊娠婦가 더하였고 또 年齡이 높을수록 甚한 傾向이었다.

2. 身體營養計測

妊娠婦, 授乳婦 모두 蛋白칼로리 營養失調에 빠져 있었으며 特히 妊娠婦가 더욱 그러하였다.

3. 生化學的 檢査

妊娠婦, 授乳婦 다 같이 慢性 鐵缺乏貧血과 蛋白缺乏에 罹患되고 있는 것이 觀察되었다.

Ⅱ. 嬰幼兒의 營養失調에 關하여

1. 臨床的 觀察

1) 臨床的으로 明確한 kwashiorkor는 없었으나 그 恒在症狀이 個別的으로 觀察되었는 데 特히 幼兒에서 그러하였다.

2) 臨床的으로 明確한 營養消耗症(marasmus)이 嬰兒(7.6%) 및 幼兒(3.3%)에서 觀察되었다.

2. 身體營養計測

嬰幼兒의 過半數가 蛋白과 칼로리缺乏에 依한 蛋白칼로리 營養失調에 罹患되었었다.

3. 어린이 中에서도 特히 幼兒에서 蛋白攝取 貧弱으로 因한 營養失調가 過半數에서 觀察되었다.

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