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A STUDY ON THE EFFECTS ADMINISTRATION OF ONE DOSE OF 300.000 I.U. ORAL VITAMIN A AND DEWORMING FOR PREVENTION AND TREATMENT OF VITAMIN A DEFICIENCY*)

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Suatu penyelidikan tentang pencegahan dan pengobatan defisiensi citamin A pada anak-anak pra-sekolah telah dikerjakan didesa Tegal dan Iwul, Bogor dengan memberikan preparat vitamin A oral dosis tinggi. Preparat tersebut mengandung emulsi retinyl-palminate 300.000 I.U. yang dicampur dengan 100 I.U. citamin E (tocopheryl acetate). Dua golongan anak yaitu 100 tanpa dan 75 dengan xerophthalmia dipergunakan untuk studi tersebut. Mereka dibagi lagi dalam 4 kelompok. Kelompok pertama diberikan hanya vitamin A oral. Kelompok kedua diberikan obat cacing (deworming) terlebih dahulu sebelum diberikan vitamin A oral, dengan combantrin (pyrantel pamoate) single dose 10 mg/kg. berat badan. Kelompok ketiga diberi obat cacing dan placebo dan kelompok keempat hanya diberi placebo.

Ternyata pada pemeriksaan setelah 6 dan 12 bulan kemudian semua anak tanpa xerophthalmia tetap terlindung dari xeropthalmia setelah diberikan vitamin A baik dengan atau tanpa deworming terlebih dahulu. Sedangkan 5–8 persen anak dengan xerophthalmia tidak dapat disembuhkan. Obat cacing tidak jelas menunjukkan pengaruhnya untuk memperbaiki penggunaan oral vitamin A, tetapi obat cacing dan vitamin A oral tersebut menunjukkan pengaruh baik terhadap keadaan gizi.
Sedangkan terhadap kejadian penyakit, pengaruhnya tidak begitu jelas.

Administration of a single massive oral dose vitamin A has been recommended for the prevention of vitamin A deficiency in pre-school children. (Swaminathan, M.C. et al., 1970: N.I.N. Hyderabad, 1972).

Satisfactory protection against xerophthalmia by means of biannual administration of 20.000 I.U. oral vitamin A mixed with 100 I,U, vitamin E as aquaous emulsion, has been reported by (Darwin Karyadi et al, 1973); Swaminathan, M.C.

They consider to administer higher doses of vitamin A because the curative effect of 200.000 I.U. oral vitamin A is not satisfactory yet.

One of the numerous factors which might interfere with the effectiveness of oral vitamin A is he infestation of ascaris worm which is quite common among less privileged families in Indonesia. Deworming prior to the administration of oral vitamin A, is therefore expected to improve the curative results also.

This paper persents the results of a study on the effects of annual administration of aquaous emulsion of 300.000 I.U. oral vitamin A mixed with 100 I.U. vitamin E and deworming for prevention and treatmnet of vitamin A deficiency in pre-scholl children.

MATERIALS AND METHODS

The study was carried out in two rural villages Tegal and Iwul in the western part of Bogor. The population was composed of 1854 families with 8080 individuals and 1697 pre-school children. They earn their living as fruit retailers, peasants or laborers at nearby plantations. Preliminary survey revealed that the prevalence of vitamin A deficiency in pre-school children was 5,7 per cent.

Sample of children for the experimental treatment: By random sampling, 175 children

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between 1–6 years old were selected (Table 1). They were divided into two groups. One group of 100 children without xerophthalmia and another one of 75 children with xerophthalmia.

Table 1. Number of cases by stages of xerophthalmia.

Treatment	Non-Xr	Xeroph.				
	(n)	(n)	X_0	X_1	X_2	X_3	X_4
Age 1 – 3 yr.							
1. Oral Vit. A	13	12	6	6	–	–	–
2. Deworm + Vit. A.	10	10	2	7	–	1	–
3. Deworm + Placebo	9	4	2	2	–	–	–
4. Placebo.	13	4	1	3	–	–	–
Subtotal	45	30	11	18	–	1	–
Age 4 – 6 yr.							
1. Oral Vit. A.	14	14	3	11	–	–	–
2. Deworm + Vit. A.	10	10	4	5	–	–	1
3. Deworm + placebo	14	14	3	11	–	–	–
4. Placebo	17	8	1	7	–	–	–
Subtotal	55	46	11	34	–	–	1
Total cases :	100	76	22	52	–	1	1

They were further divided into 4 subgroups which were subjected to different experimental treatment, resp: administration of a massive oral dose of vitamin A, administration of massive oral dose of vitamin A after deworming, administration of a placebo after deworming and administration of a placebo.

Oral vitamin A preparation: Individual vials containing 5 ml of aquaous emulsion of 300.000 I.U. oral vitamin A mixed with 100 I.U. vitamin E were prepared by the courtesy of the Kimia Farma in Jakarta.

Deworming: Single dose of an anthelmintic, Combantrin (Pfizer) at 10 mg/kg body weight was given one week before the administration of oral vitamin A.

The children were examined 3 times: Before, 6 months after and 12 months after the experimental treatment.

The examination comprised: Clinical examination by a paediatrician to assess the nutritional and general health status, particularly to assess the stage of xerophthalmia (Ten Doesschate 1968), anthropometric measurements and dietary analysis, by nutritionist who were assisted by paramedical personnel.

No attempt was made to determine the level of serum vitamin A because of psychological and practical reasons.

RESULTS AND DISCUSSION

The results of study were as follows :

Acceptability of oral vitamin A preparation: all 93 children with and without xerophthalmia, accepted the preparation of the oral vitamin A without any serious difficulty. Their parents reported that no symptoms or complaints of gastro-intestinal and neurological disturbances were encountered during the first 4 hours and for the next 2 days after administration of the oral vitamin A.

Effects of deworming: Discharge of ascaris worms occured after deworming in 25 out of 37 children (70 per cent) with xerophthalmia. The average number of ascaris worms was 10 (range 2–25). There were only 24 out of 45 children (53 per cent) without xerophthalmia discharged ascaris worms after deworming.

The average number of ascaris worms was 7 (range 1–19).

Nutritional status: Physical examination did not reveal any case of fullblown Kwashiorkor or severe marasmic child. Scoring of the nutritional status by means of the armcircumference/length ratio (after Arnold), revealed that the group of children without xerophthalmia had more number of cases with score 1 (which was not suspected for Protein-calorie malnutrition) as compared to the group of children suffering from xerophthalmia (Table 2). Four out of 100 (4 per-cent) children without xerophthalmia and 6 out of 75 children (8 percent) suffering from xerophthalmia had score 4 or suffering from severe P.C.M. before the experimental treatment.

Table 2. The percentage of children by nutritional status *)

Exp. Treatment	Number of children	Before Nutr. Score				60 Mo. After Nutr. Score				12 Mo. After Nutr. Score			
		1	2	3	4	1	2	3	4	1	2	3	4
Non-Xeroph.													
1. Oral Vit. A.	27	59	33	8	–	74	22	4	–	78	22	–	–
2. Deworm + Vit. A.	20	60	30	10	–	65	30	5	–	65	30	5	–
3. Deworm t Plac.	23	61	31	4	4	61	35	4	–	69	26	6	–
4. Placebo	30	77	20	3	–	77	17	6	–	77	20	3	–
Xeroph.													
1. Oral Vit. A.	25	40	36	24	–	64	24	12	–	68	24	8	–
2. Deworm + Vit. A.	20	40	40	20	–	50	45	5	–	65	25	–	–
3. Deworm + Plac.	17	53	29	12	6	53	41	6	–	65	29	6	–
4. Placebo	11	45	36	19	–	55	36	9	–	54	46	–	–

*) Quack-stick, Score 2 = normal
Score 2, 3, 4 = P.C.M.

Improvement in the percentage of children who had better nutritional status score, was observed at 6 months and 12 months after administration of the oral vitamin A. Deworming was also associated with the improvement in the percentage of children who had better nutritional score. It was difficult to make any conclusion about the association between the improvement of the nutritional score and the treatmnet with the oral vitamin A and deworming, because many other factors might have been responsible.

Dietary analysis: Results of dietary analysis which was done before the experimental treatment, revealed that in general the daily intake of nutrients was low, particularly as regards to protein, calories, fat and vitamin A/carotene (Table 3). The data showed no positive correlation between the intake of vitamin A and the occurence of xerophthalmia.

Table 3. Average daily intake of nutrients.

Nutrient	1 – 3 Yr.			4 – 6 Yr.		
	R.D.A.	Non-Xeroph (% RDA)	Xeroph. (% RDA)	R.D.A.	Non-Xeroph. (% RDA)	Xeroph. (% RDA)
1. Protein (g)	25	14.5 (58)	17.8 (71)	30	23.1 (75)	14.8 (47)
2. Calories (Cal.)	1200	545 (45)	654 (41)	1600	842 (50)	703 (45)
3. Carbohydrate (g)	–	113	134	–	174	121
4. Fat (g)	–	4,0	5,3	5	4,7	5,0
5. Calsium (mg)	500	6,5	94	500	80,0	79
6. Ferum (mg)	10	1,8	2,1	10	3,0	2,9
7. Vitamin A/Carot (Ug)	1500	222 (14)	440 (39)	1800	359 (24)	318 (21)
8. Vitamin C (mg)	30	3,3	10,8	40	9,5	7,6
9. Vitamin B_1 (Mg)	400	239	588	600	326	1006

Associated infections: Upper respiratory tract infectious was most prevalent during the three periods of the clinical examination (Table 4). Children who were treated with oral vitamin A or deworming, seemed to be more resistant to i nfection as compared to those treated with placebo, at 6 months and 12 momths after the treatment.

Results of prevention: All 47 children (including 20 cases after deworming) who were treated with massive dose of oral vitamin A, were protected against cerophthalmia at 6 months and even at 12 months after the treatment (Table 5). The effect of deworming was similar to the placebo.

Curative effects on xerophthalmia' At 6 months and 12 months after the administration of the massive oral dose of vitamin A, all 22 cases 1–2 years old of X0 and X1 were found "cured" (Table 6), (1 case X3 was not included). But in the age group 4–6 years, 2 out of 23 cases X0 and X1 were not cured or unprotected at 6 months after treatment with oral vitamin A. After another 6 mounths, how-

Table 4. The percentage prevalence of associated infections.

Exp. Treatment	(n)	Upper resp.			Lower resp.			S k i n			Gastr. Int.		
		I	II	III	I	II	III	I	II	III	I	II	III
Non-Xeroph.													
1. Oral Vit. A.	27	45	52	52	4	7	2	18	33	22	–	–	–
2. Deworm + Vit. A.	20	55	70	50	–	5	–	25	20	30	–	–	–
3. Deworm + Plas.	23	52	48	48	4	17	–	4	8	26	4	–	–
4. Placebo.	30	27	69	47	3	7	–	30	30	20	7	–	–
Xeroph.													
1. Oral Vit. A.	25	64	44	57	12	8	4	20	28	16	4	4	–
2. Deworm + Vit. A.	20	40	40	46	5	–	–	5	5	15	5	–	–
3. Deworm + Plac.	17	53	23	31	–	6	–	6	17	12	17	12	–
4. Placebo.	11	36	73	54	9	–	–	9	45	9	5	–	–

*) I = Before; II = 6 months after; III = 12 months after treatment.

Table 5 : The protective effects of 300.000 I.U. Vit. A and deworming.

Treatment	Total Cases	Protected n(%)	Unpr. n(%)	Total Cases	Protected n(%)	Unpr. n(%)	Total Cases	Protected n(%)	Unp n(%)
6 months after									
1. Oral Vit. A.	13	13 (100)	–	14	14 (100)	–	27	27 (100)	–
2. Deworm + Vit. A.	10	10 (100)	–	10	10 (100)	–	20	20 (100)	–
3. Deworm + Plac.	9	9 (100)	–	14	13 (100)	–	23	22 (95)	1, (5
4. Placebo.	13	11 (100)	2 (15)	17	17 (100)	–	30	28 (92)	2 (8
12 months after									
1 Oral Vit. A.	13	13 (100)	–	14	14 (100)	–	27	27 (100)	–
2. Deworm + Vit. A	10	10 (100)	–	10	10 (100)	–	20	20 (100)	–
3. Deworm + Plac.	9	8 (88)	1 (12)	14	14 (100)	–	23	22 (95)	1 (5
4. Placebo	13	11 (85)	2 (15)	17	16 (94)	1 (6)	30	27 (90)	3 (1

ever, one case X1 was "spontaneously cured) while one case X1 reappeared. Deworming did not seem to improve the effectiveness of oral vitamin A. Besides that „spontaneous cure" cases which were also observed in children treated with deworming was similarly also observed in chlidren treated with the placebo. Two cases had already irreversible damaga before treatment.

dietary intake, was the awareness of the people in that village about the early symptoms of vitamin A deficiency, and they knew the remedy of the disease by giving plenty of liver to the children suffering from vitamin A is not possible to increase, the clinical way of treatment of xerophthalmia should be done in order to prevent further deterioration of xerophthalmia.

Table 6 : The curative effects of 300.000 I.U. oral Vit. A and deworming.

	Number of Children	6 months after						12months after					
		Cured „ (%)	Not cured X_0	X_1	X_2	X_3	X_4	Cured „ (%)	Not cured X_0	X_1	X_2	X_3	X_4
Age 1 – 3													
1 Oral Vit A	12	12(100)	–	–	–	–	–	12(100)	–	–	–	–	–
2 Deworm + Vit. A	10	9(90)	–	–	–	1	–	9(90)	–	–	–	–	1
3. Deworm + Plac.	4	3(75)	–	1	–	–	–	2(50)	2	–	–	–	–
4. Placebo.	4	4(100)	–	–	–	–	–	2(50)	–	2	–	–	–
Age 4 – 6													
1. Oral Vit. A	14	13(98)	–	1	–	–	–	12(86)	1	1	–	–	–
2. Deworm + Vit. A.	10	8(80)	–	1	–	–	1	9(90)	–	–	–	–	1
3. Deworm + Plac.	13	8(61)	4	1	–	–	–	9(70)	1	3	–	–	–
4. Placebo.	8	7(87)	–	1	–	–	–	7(87)	–	1	–	–	–

Protection of xerophthalmia by means of annual administration of aquaous emulsion of 300.000 I.U. oral vitamin A mixed with 100 I.U. vitamin E was observed in 46 pre-school children at 6 months and 12 months after administration of oral vitamin A. Similar results were also observed at least up to 6 months in the earlier study by Darwin et al., 1973. Curative results of this 300.000 I.U. oral vitamin A. has not been satisfactory yet.

It is not really suprising because the dose of 300.000 I.U. is only equal to the curative dose of about 20.000 I.U./kg. body weight which is still far below the maximal curative dose for xerophthalmia.

The facts that some cases of X0 and X1 can be spontaneously cured, indicates that dietary intake of vitamin A/carotene is sometimes capable to meet the need of vitamin A for curative purposes. Among the various factors which might contribute to the increase in the

SUMMARY AND CONCLUSIONS

The effects of administration of a single massive dose of oral vitamin A and deworming for prevention and treatment of xerophthalmia has been studied up to one year, on 100 apparently normal and 75 children with xerophthalmia.

The preparation containing aquaous emulsion of 300.000 I.U. oral vitamin A mixed with 100 I.U. vitamin E was accepted without any serious difficulty.

Protection against xerophthalmia was observed at least up to one year on all apparently normal children after administration of a single dose of the oral citamin A preparation.

Curative effect on xerophthalmia was found in almost all children with early stage of xerophthalmia only two out of 46 cases remained unprotected (not cured) and another two had

already irreversible damage before the administration of oral vitamin A preparation.

Deworming was apparently of no advantage as regard to its specific effect for prevention of xerophthalmia as well as to improve the effectiveness of oral vitamin A preparation.

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