Impact of vitamin D3 supplementation on weight gain in malnourished children of Yawatmal district

Ajay Kasumbiwal¹, Vishal Chavan^{2*}

^{1,2}Assistant Professor, Department of Pediatrics, SVNGMC, Yavatmal, Maharashtra, INDIA. **Email:**<u>vshal.dr@gmail.com</u>

Abstract Introduction: Under nutrition is leading cause of morbidity and mortality in India which is associated with various nutrients deficiencies including Vitamin D. High prevalence rates of Vitamin D deficiency have been reported, for example, among children from Asia and the Middle East. To confirm our observation that supplemental Vitamin D in under nourished children is associated with weight gain, this study was conducted. Methods: Study conducted as a pilot study. Data of study was collected at a P.H.C. in Yavatmal district on OPD basis over a period of six month during 2012-2013. Patient belonging to SAM and MAM category were included. Registered patient intervened with three doses of inj. Vitamin D3(Arachitaol- Abbott) at weekly interval. Patient more than 6 kg received 6lac IU of vitamin D3 and patient less than 6 kg received 3 lac IU of vitamin D3. Weight of the patient was recorded at the time of registration, with each injection and at the end of one month from last injection. Weight gain in patient was compared and analysed. Result: Significant weight gain was observed in all the groups like combined, male, female, SAM and MAM. Conclusion: Persistent Vitamin D deficiency may hamper weight gain under nourished children. Administration of Vitamin D in treatment dose in under nourished children boosts weight gain and recovery. Larger case control study is required to confirm and formulate guidelines on Vitamin D supplementation in under nourished children. Key words: SAM, MAM, Vitamin D.

*Address for Correspondence:

Dr. Vishal Chavan, Assistant Professor, Department of Pediatrics, SVNGMC, Yavatmal, Maharashtra, INDIA. **Email:** <u>vshal.dr@gmail.com</u>

Received Date: 22/07/2015 Revised Date: 03/08/2015 Accepted Date: 12/09/2015



INTRODUCTION

Under nutrition is leading cause of morbidity and mortality in India. Under nutrition is associated with various micronutrients deficiencies¹. Signs and symptoms of vitamin D deficiency is usually masked in malnourished children². Biomarkers of vit. D deficiency have limitations because many physiologic factors and methodological difficulties affect them. Of the possibilities researched to date, only the plasma concentration of 25(OH)D, plasma concentration of PTH, and the absence or presence of rickets have found wide utility³. Prevalence of under nutrition is up to the tune of 47 % in India. Prevalence of vitamin D deficiency is also high in many parts of world and is a cause of considerable public health concern. High prevalence rates have been reported, for example, among children from Asia and the Middle East⁴. We observed that Vitamin D Supplementation in children among admitted under nourished children in ward and children treated in health check up at tribal area suggest that the rate of weight gain was better in children receiving vitamin D3 (Cholecalciferol). To conferm our observation this study was conducted.

AIMS AND OBJECTIVES

To study the weight gain in under nourished children after injectable vitamin D3 supplementation in OPD patient.

MATERIAL AND METHODS

Study conducted as a pilot study to evaluate effect of vitamin D3 administration in under nourished children. Prior permission of Ethical committee on research of SVNGMC&H Yavatmal was taken. Data of study was collected at a P.H.C. in Yavatmal district on OPD basis over a period of six month during 2012-2013. Patient belonging to SAM and MAM category were included and

How to site this article: Ajay Kasumbiwal, Vishal Chavan. Impact of vitamin D3 supplementation on weight gain in malnourished children of Yawatmal district. *International Journal of Recent Trends in Science and Technology*. September 2015; 16(2): 436-439 http://www.statperson.com (accessed 20 September 2015).

registered after written consent. Registered patient intervened with three doses of inj. Vitamin D3(Arachitaol- Abbott) only. Patient more than 6 kg. received 6lac IU of vitamin D3 and patient less than 6 kg. received 3 lac IU of vitamin D3. Three doses of vitamin D3 was given at the interval of one week. Weight of the patient was recorded at the time of registration, with each injection and at the end of one month from last injection. Weight gain in patient was compared and analysed.

OBSERVATION AND RESULTS

Table 1									
		Mean	Ν	Std. Deviation	Std. Error Mean				
Pair 1	Weight Before Study	8403.4884	86	2387.87416	257.49109				
	WEIGHT ON DAY SEVEN	8627.2093	86	2398.22368	258.60711				
Dain 3	Weight Before Study	8403.4884	86	2387.87416	257.49109				
Pall Z	WEIGHT ON DAY 14	8812.5581	86	2398.97487	258.68811				
Dain 2	Weight Before Study	8403.4884	86	2387.87416	257.49109				
Pall 5	WEIGHT ON DAY 44	9026.7442	86	2379.80100	256.62054				
Pair 2 Pair 3	Weight Before Study WEIGHT ON DAY 14 Weight Before Study WEIGHT ON DAY 44	8627.2093 8403.4884 8812.5581 8403.4884 9026.7442	86 86 86 86 86	2398.22508 2387.87416 2398.97487 2387.87416 2379.80100	258.60711 257.49109 258.68811 257.49109 256.62054				

Significant weight gain present after each Vitamin D injection and one month after last injection in all patient group.

Table 2										
Paired Differences										
		Mean SD		SEM	95% Confiden Diff	t	df	Sig. (2-tailed)		
				-	Lower	Upper	-			
Pair 1	Weight Before Study - WEIGHT ON DAY SEVEN	-223.72093	311.08178	33.54481	-290.41700	-157.02486	-6.669	85	.000	
Pair 2	Weight Before Study - WEIGHT ON DAY 14	-409.06977	446.89156	48.18956	-504.88352	-313.25602	-8.489	85	.000	
Pair 3	Weight Before Study - WEIGHT ON DAY 44	-623.25581	726.87638	78.38110	-779.09843	-467.41320	-7.952	85	.000	

Persistent and significant weight gain present after each Vitamin D injection and one month after last injection in all patient group.

Table 3: Genderwise Female									
Mean N Std. Deviation Std. Error Mea									
Doir 1	Weight Before Study	7620.2381	42	1862.49962	287.38993				
Pair 1	WEIGHT ON DAY SEVEN	7857.1429	42	1916.65013	295.74554				
Da: # 2	Weight Before Study	7620.2381	42	1862.49962	287.38993				
Pair 2	WEIGHT ON DAY 14	8042.3810	42	1911.69674	294.98121				
Da: # 2	Weight Before Study	7620.2381	42	1862.49962	287.38993				
Pair 3	WEIGHT ON DAY 44	8232.1429	42	1910.17243	294.74600				

Significant weight gain present after each Vitamin D injection and one month after last injection in all patient group.

	Table 4									
	Paired Samples Test									
				Paired Differ	ences					
					95% Confiden	t df	.16	Cia (2 tailad)		
		Mean	SD	SEM	Difference		ai	Sig. (z-talled)		
					Lower	Upper	_			
Pair 1	Weight Before Study - WEIGHT ON DAY SEVEN	-236.90476	331.24663	51.11247	-340.12848	-133.68104	-4.635	41	.000	
Pair 2	Weight Before Study - WEIGHT ON DAY 14	-422.14286	499.22152	77.03155	-577.71123	-266.57448	-5.480	41	.000	
Pair 3	Weight Before Study - WEIGHT ON DAY 44	-611.90476	668.04863	103.08214	-820.08337	-403.72616	-5.936	41	.000	

				Table 5	: Male					
				Mean	Ν	Std. Deviation	Std. Error Mean	1		
	Doir 1	Weight Befo	ore Study	9151.136	4 44	2606.24850	392.90674			
	Pair 1	WEIGHT ON I	DAY SEVEN	9362.272	7 44	2595.07572	391.22238			
	Doir 2	Weight Befo	ore Study	9151.136	4 44	2606.24850	392.90674			
	Pall 2	WEIGHT ON	NDAY 14	9547.727	3 44	2599.86481	391.94437			
		Weight Befo	ore Study	9151.136	4 44	2606.24850	392.90674			
	Pair 3	WEIGHT ON	NDAY 44	9785.227	3 44	2551.62009	384.67120			
				Tabl	0.6					
				Pair	ed Differer	ices				
						95% Confidence	Interval of the	-		
		Mean	c	so s	FM	Differ	ence	t	df	Sig. (2-tailed
		mean				Lower	Upper	-		
Pair 1	Weight Before Study - WEIG	HT -211,1363	6 293.8	83761 44.3	29769	-300.47116	-121.80157	-4.766	43	.000
	ON DAY SEVEN Weight Before Study - WEIG									
Pair 2	ON DAY 14	-396.5909	1 396.0	00883 59.	70058	-516.98860	-276.19322	-6.643	43	.000
Pair 3	Weight Before Study - WEIG ON DAY 44	HT -634.0909	1 786.	53292 118.	.57430	-873.21877	-394.96304	-5.348	43	.000
			Table	7: Malnutritio	on category	v (mam)				
			10010	Mean	N	Std. Deviation	Std. Error Mean			
		Weight Ref	ore Study	8705 172	4 58	1984 36188	260 559/18			
	Pair 1		NV SEVEN	8705.172	-+ JO 2 58	1001 /7685	200.33348			
		Weight Rofe	oro Study	877.300 8705 173	7 2 30 7 50	1091.47085	201.49372			
	Pair 2			0021 024	4 JO E E0	1964.30166	200.33948			
			N DAT 14	9051.054		1900.75940	250.24017			
	Pair 3	Weight Ber	bre Study	8/05.1/2	4 58 0 50	1984.36188	260.55948			
		WEIGHT OF	N DAY 44	9322.413	8 58	1939.98039	254.73190			
				Tabl	le 8					
				Pd	lired Differ	95% C	onfidence			
		Moon SD SEM Interval of the Difference							df	Sig. (2-tailed
		IVI	ean	30	SEIVI	Lower	Upper			
Pair 1	Weight Before Study - WEIG	GHT ON -172	41379	223.83664	29.3911	9 -231.26864	-113.55895	-5.866	57	.000
Dain 2	DAY SEVEN Weight Before Study - WEI	HT ON 225	06207	242 62472	44.0500	- 400.00540	242 65006	7 0 2 0		000
Pair 2	DAY 14	-325	.86207	312.63473	41.0509	5 -408.06518	-243.65896	-7.938	57	.000
Pair 3	Weight Before Study - WEI DAY 44	617 ON	.24138	824.65047	108.2819	-834.07217	-400.41059	-5.700	57	.000
-						()				
			Table	e 9: Malnutriti	on categor	y (sam)				
				Paired Samp	les Statisti	cs				
				Mean	N	Std. Deviation	Std. Error Mean			
	Pair 1	Weight Befo	ore Study	7778.571	4 28	3006.18709	568.11596			
		WEIGHT ON I	DAY SEVEN	8108.571	4 28	3052.91083	576.94592			
	Dair 7	Weight Befo	ore Study	7778.571	4 28	3006.18709	568.11596			
		WEIGHT ON	NDAY 14	8360.000	0 28	3104.32554	586.66238			
		MAR - Later Def	- · ·	7770 574	1 20	2006 40700	568.11596			
	Dair 2	weight Berg	ore Study	///8.5/1	4 20	3006.18709				
	Pair 3	Weight Bero	ore Study NDAY 44	8414.285	4 28 7 28	3006.18709	576.54702			
	Pair 3 ————————————————————————————————————	Weight Bero WEIGHT ON	ore Study NDAY 44	7778.571 8414.285 Table	4 28 7 28 e 10	3050.80005	576.54702			
	Pair 3	WEIGHT ON	ore Study NDAY 44	7778.571 8414.285 Table Pair	4 20 7 28 e 10 red Differe	3006.18709 3050.80005 ences	576.54702			
	Pair 3	Weight Berg WEIGHT Of	ore Study NDAY 44	7778.571 8414.285 Table Pair	4 28 7 28 e 10 red Differe	3006.18709 3050.80005 ences 95% Confide	576.54702	_		
	Pair 3	Weight Berg WEIGHT Of	ore Study N DAY 44	7778.571 8414.285 Table Pair	4 28 7 28 e 10 red Differe SEM	3006.18709 3050.80005 ences 95% Confide of the Di	576.54702	t	df	Sig. (2-tailed)
	Pair 3	Weight Berg WEIGHT Of	ore Study N DAY 44	7778.571 8414.285 Table Pair	4 28 7 28 e 10 red Differe SEM	3006.18709 3050.80005 ences 95% Confide of the Di	576.54702 Ince Interval	t	df	Sig. (2-tailed)
Pair 1	Pair 3 Weight Before Study - W	Weight Berg WEIGHT Of Me EIGHT -330.0	an	7778.571 8414.285 Table Pair SD 426.04121	4 28 7 28 e 10 red Differe SEM 80.51422	3006.18709 3050.80005 ences 95% Confide of the Di Lower -495.20153	576.54702 Ince Interval fference Upper -164.79847	t 4.099	df 27	Sig. (2-tailed) .000
Pair 1	Pair 3 Weight Before Study - W ON DAY SEVEN Weight Before Study - W	Weight Berg WEIGHT Of EIGHT -330.0	ore Study N DAY 44	7778.571 8414.285 Table Pair SD 426.04121	4 28 7 28 e 10 red Differe SEM 80.51422	3006.18709 3050.80005 ences 95% Confide of the Di Lower -495.20153	576.54702 mce Interval fference Upper -164.79847	t 4.099	df 27	Sig. (2-tailed) .000

Dair 2	Weight Before Study - WEIGHT	625 71/20	176 90120	00 12400	820 62246	450 70511	7 05/	27	000
rall 5	ON DAY 44	-035.71425	470.09139	90.12400	-820.03340	-430.79311	-7.054	27	.000

DISCUSSION

The observation and result is are quite in the contrast to traditional perception from the knowledge based on the standard text books of pediatrics and nutrition. This study makes us to revise the assumptions regarding malnutrition and vitamin D. Even though malnutrition and poverty seems related from ages, children from affluent family also are affected. The population under study has good access to medical facility but still incidence of malnutrition was significant. Malnutrition is not just deficiency of food (since children are fed on priority basis in every home) but appear a symptom complex or syndrome since every system of body is affected. These type of symptom complex points to it may be some hormonal deficiency a hormone which overlooked or neglected or yet to known. Many studies shown deficiency of vitamin D even in template zone where sun rays are ample, consolidate our knowledge that we don't get Vitamin D from Sun but it is converted to active form with the help of sunrays. In this study, it was observed that those children who were more malnourished shown better improvement. Many researchers think the vitamin

D is not vitamin but its action are like hormone and it should be called as *SUNSHINE* hormone. Though study size is bit small but results are significant by which we may say Malnutrition syndrome significantly contributed due the deficiency of some hormone and hormone is Sunshine hormone (Vitamin D). We must not forget the incidence of malnutrition is not decreasing since past 45 years in spite of so much effort This role of Vitamin D, if justified and proved beyond dought by doing a bigger study, we may bring malnutrition less than 8% in short period.

CONCLUSIONS

Persistent Vitamin D deficiency may hamper weight gain under nourished children. Administration of Vitamin D in treatment dose in under nourished children boosts weight gain and recovery. Larger case control study is required to confirm and formulate guidelines on Vitamin D supplementation in under nourished children.

REFERENCES

Source of Support: None Declared Conflict of Interest: None Declared