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Research Article

**SUBCLINICAL RICKETS IN THE LIGHT OF DISEASE  
PREVALENCE, DISTRIBUTION OF GENDER AND  
GEOGRAPHICAL VARIATIONS**<sup>1</sup>Dr. Misbah Zeb, <sup>2</sup>Dr Nabgha Arif, <sup>3</sup>Dr. Aneeqa Nawaz<sup>1</sup>Mayo Hospital Lahore<sup>2</sup>Services Hospital Lahore<sup>3</sup>Sheikh Zayed Medical College Rahimyar Khan**Abstract:**

**Objective:** Sub-clinical rickets is a disease on which preplanned research studies are not conducted. The interrelated features related to school students regarding subclinical rickets and further elements like Geographical distribution, gender, and prevalence will be debated in our study.

**Methods:** A total number of 190 school children (comprising over the age group, 11 years to 16 years) from rural and urban areas were studied at Sir Ganga Ram Hospital, Lahore (March, 2016 to February, 2017). Subclinical matters were inspected with unbalanced biochemical discoveries, lacking physiological symptoms of rickets.

**Results:** Geologically 26 cases of the disease were found in the school children belonging to rural areas, 16 from urban and 9 from suburban areas. The disease found in the school children was comprising over 8% boys and 19% girls. None of the school children were having (parathyroid level) higher than peak of normal range and the whole number of subclinical cases depicted the value in mid ( $\geq 18\text{nmol/l}$ ) to ( $\geq 39\text{nmol/l}$ ). The expected values were not matched and the deficient (Vitamin D), (Calcium) and (Phosphorus) in routine foods was observed. In deficiency rate in comparison was the same in boys and girls.

**Conclusion:** The big factor behind clinical rickets is deficiency of synergistic outcome of sunshine vitamin D and this disease is covered up (not apparent) amongst the school children. The major purpose of our research was to debate the gender, geological spreading and prevalence of sub clinical rickets and their interconnected elements among children.

**Key Words:** Camouflage rickets, Sub clinical, Physical indications, Synergistic effect and Daily meals.

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**INTRODUCTION:**

In the adolescent period, demand of minerals and

nutrients is high due to which the chances of this disease becomes high. Foods and endogenous synthesis in the digestion system is responsible for the quantity of Vitamin D level in the blood. There are chances of rickets if the growing bones in the skeleton are deprived of nutrition and minerals. The factor appears for the Secondary hyperthyroidism due to reduced calcium level which further causes reduction in intestinal absorption as it is seen in the deficiency cases of Vitamin D. In Pakistan we hardly find preplanned work on subclinical rickets. Rickets due to deficiency of Vitamin D, is a major issue in children of the countries in our region and many studies are conducted in many countries excluding Pakistan.

#### **METHODS:**

A total number of 190 school children (comprising over the age group, 11 – 16) years from rural and urban areas were studied at Sir Ganga Ram Hospital, Lahore (March, 2016 to February, 2017). Subclinical matters were inspected with unbalanced biochemical discoveries, lacking physiological symptoms of rickets. Necessary permissions were obtained from the Parents of school children and concerning authorities earlier to initiation of study. Three groups were made depending upon their rural, urban and suburban living and setting status and as per their school addresses. After checking up the values and levels of blood urea and creatinine, one hundred and ninety school children were considered normal for participation in the study. Experts doctors medically examined the school children and statistical values and levels were recorded on data forms which included age, height, exposure to sunshine, Vitamin D, Phosphorus and Calcium. For examination of data Minitab statistics software was used. Serum was obtained through centrifugation of blood samples taken from the participant children. After that assessment of serum was evaluated to obtain values of (25 (OH) D), phosphatase (parathyroid alkaline), Calcium and Phosphorus. Average levels were calculated and measured and significant changed values of limits ( $< 0.05$ ) were analyzed amongst the groups.

#### **RESULTS:**

The number of participating boys and girls school children was similar in the whole 3 geological groups

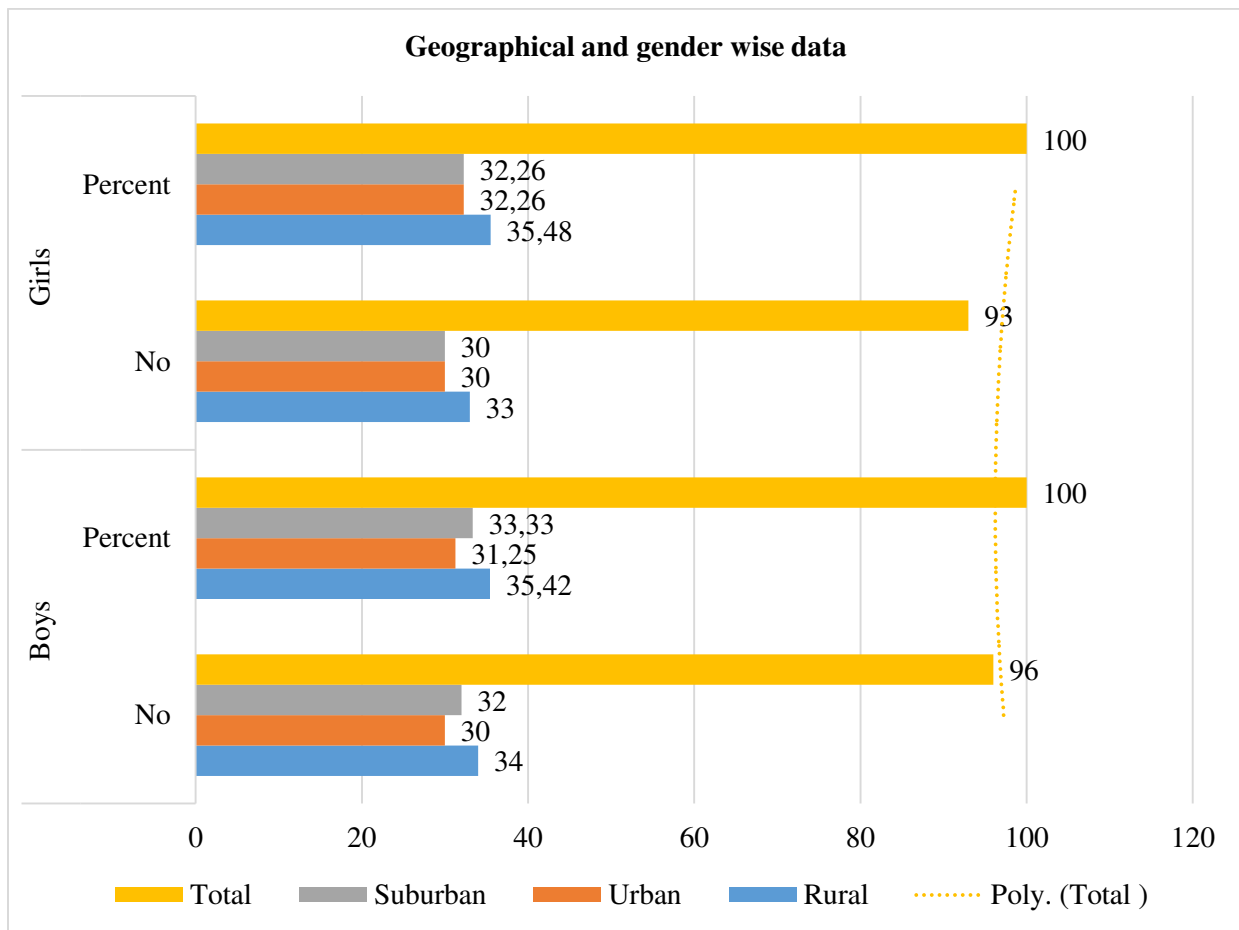
( $> 0.05$ ). The ratio of Boys and girls was almost similar as 96:94, boys and girls respectively out of total 190 participants. The average of the age of boys ( $13.84 \pm 1.58$ ) years; whereas, for girls ( $14.76 \pm 1.45$ ) years without any statistical variations ( $> 0.05$ ). Sub clinical rickets cases was found (27%) 51, out of which (29%) 15 were boys and (71%) 36 were girls Amongst total 190 school children. Geologically Urban residents were 16 (31%) and suburban residents were 10 (20%), and 26 (51%) sub clinical cases belonged to rural area. It was observed that sub-clinical rickets occurrence amongst girls and boys was respectively 36 (20%) and 15 (8%) and was noted according to geological distribution with significant difference ( $< 0.05$ ).

The deficiency of Calcium, Vitamin D and Phosphorus in routine food schedule was observed in the values under the nutritional shade of all participants of the study 190. Significant difference was not apparent ( $> 0.05$ ) as the expected level of nutrition and minerals consumed by sub-clinical patients in regular food was not higher than usual cases consumption. On the other hand, (in comparison between the same in gender groups, and different in gender groups, of same zone groups amongst rural, city and suburban sub clinical, there was no significant difference according to the daily consumption of (vitamin D), (calcium) and (phosphorus). ( $> 0.05$ ) The value of the Vitamin D in the serum of girls from rural area was (23.44 nmol/l) and in urban (28.93 nmol/l). In suburban (33.52 nmol/l) and in the serum of boys it was in rural (28 nmol/l), in urban (33.6 nmol/l) And in suburban (38.35 nmol/l). In comparison between the urban and suburban medical cases, the values of vitamin D is apparently small. While comparing the rural and city (sub clinical cases) the serum was found having (Calcium) and (alkaline) Phosphate levels with important difference ( $< 0.05$ ) in normal cases. There was no significant difference in sub-urban normal and irregular cases.

Parathyroid hormone value was high in subclinical in contrast with the usual cases and all values were below normal limit but on the other side mean values of phosphorus levels in serum of all group were within normal limit and no apparent difference was there ( $> 0.05$ ).

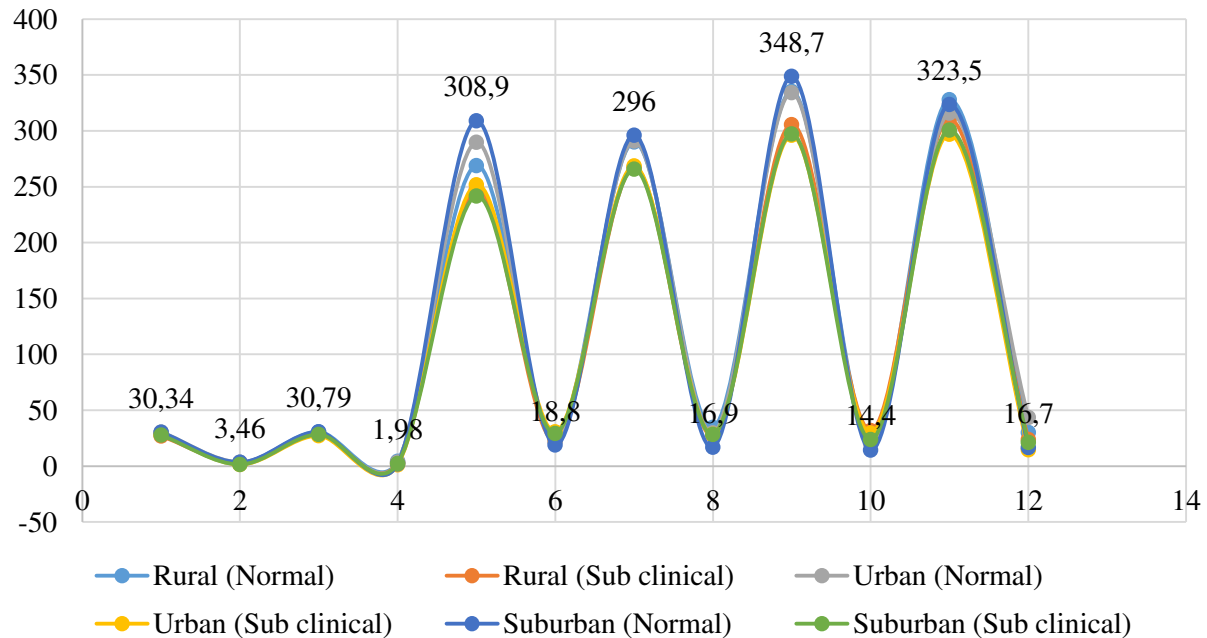
**Table – I:** Geographical and gender wise data of study participants

Groups	Boys			Girls			P value
	No	Percent	Age (years) Mean ± SD	No	Percent	Age (years) Mean ± SD	
Rural	34	35.42	13.69±1.69	33	35.48	13.96±1.54	>0.05
Urban	30	31.25	13.93±1.64	30	32.26	13.75±1.42	
Suburban	32	33.33	13.87±1.47	30	32.26	13.54±1.40	
Total	96	100	13.83±1.58	93	100	13.76±1.45	



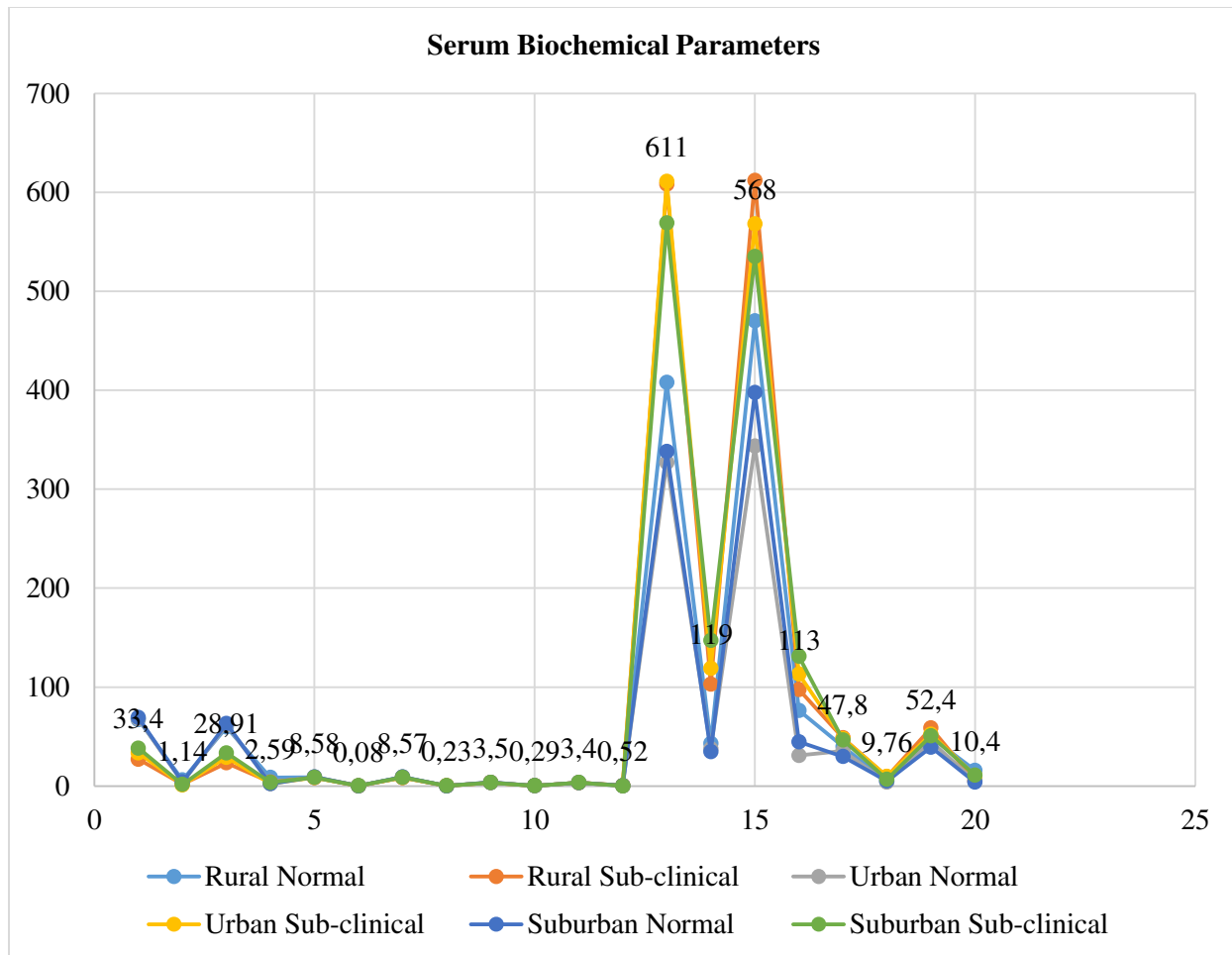
**Table – II:** Comparison of nutritional intakes by normal and sub clinical cases of different gender and groups

Groups	Vitamin D(IU)				Calcium(mg)				Phosphorus (mg)			
	Boys		Girls		Boys		Girls		Boys		Girls	
	Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD	Mean	±SD
<b>Rural (Normal)</b>	29.48	3.14	30.64	4.22	268.9	25.9	290.1	34.6	335.4	26	327.9	30.1
<b>Rural (Sub clinical)</b>	26.86	2.67	27.95	3.08	247.3	22.5	267.2	27.4	305.7	31.7	310.6	23.7
<b>P value</b>	0.05		0.055		0.053		0.051		0.052		0.088	
<b>Urban (Normal)</b>	30.48	3.55	29.05	3.44	289.7	21.7	291.1	29.8	334.3	20.1	315.9	43.5
<b>Urban (Sub clinical)</b>	28.4	1.52	27.27	1.19	251.8	30.7	268.5	28.3	296	29.5	297	14.6
<b>P value</b>	0.052		0.051		0.058		0.052		0.05		0.095	
<b>Suburban (Normal)</b>	30.34	3.46	30.79	1.98	308.9	18.8	296	16.9	348.7	14.4	323.5	16.7
<b>Suburban (Sub clinical)</b>	27.67	1.53	28.33	2.42	241.7	29.3	265.8	28.4	297.3	23.7	300.8	21.1
<b>P value</b>	0.07		0.061		0.06		0.054		0.066		0.05	

**Nutritional Intake (X - Y Scatter Chart)**

**Table – III:** Comparison of serum biochemical parameters in normal and sub clinical cases of different gender and groups

Groups			Rural Normal	Rural Sub-clinical	P-value	Urban Normal	Urban Sub-clinical	P-value	Suburban Normal	Suburban Sub-clinical	P-value
Vitamin D (nmol/l)	Boys	Mean	67.06	27	0	67.96	33.4	0	69.21	38.33	0
		± SD	6.06	1.91		3.66	1.14		4.08	1.53	
	Girls	Mean	59.57	23.42	0	61.58	28.91	0	63.13	33.5	0
		± SD	8.55	3.98		2.65	2.59		2.15	3.73	
Calcium (mg/dl)	Boys	Mean	8.87	8.52	0.0008	9.18	8.58	0	9.1	8.6	0.064
		± SD	0.11	0.15		0.2	0.08		0.17	0.26	
	Girls	Mean	8.98	8.47	0	8.96	8.57	0.0002	9.1	8.71	0.058
		± SD	0.18	0.1		0.16	0.23		0.13	0.37	
Phosphorus (mg/dl)	Boys	Mean	3.4	3.51	0.33	3.6	3.5	0.48	3.65	3.43	0.42
		± SD	0.15	0.26		0.25	0.29		0.24	0.37	
	Girls	Mean	3.5	3.3	0.13	3.5	3.4	0.55	3.4	3.49	0.64
		± SD	0.2	0.48		0.14	0.52		0.44	0.15	
ALP (U/l)	Boys	Mean	407.8	608	0.0023	326.8	611	0.0062	338.1	569	0.11
		± SD	43	103		37.7	119		34.8	147	
	Girls	Mean	470	612	0.0001	343.4	568	0.0001	397.5	535	0.052
		± SD	76.4	97.6		30.9	113		44.6	131	
PTH (pg/ml)	Boys	Mean	39.89	48.71	0.054	35.48	47.8	0.05	29.76	46.67	0.051
		± SD	4.57	9.48		3.74	9.76		5.07	6.66	
	Girls	Mean	49.3	58.68	0.05	45.05	52.4	0.05	39.17	50.7	0.051
		± SD	15.8	5.04		5.07	10.4		3.89	10.8	



### DISCUSSION:

It is under consideration, that sub clinical rickets is at alarming condition in our region with prevalence rate of 27% amongst school children, even though this exist

In the school children of our all over region but it is apparent fact that, major involvement is from the rural participants 26 (51%). Various studies in this prospect revealed that the rickets effected more citizens in urban population as compared to rural population. It was seen that the low and poor availability of sun rays in rural areas is an alarming element for school children because of ecological uncertainty and influence of old traditions. Current data showed that in participant, dominant figure was comprising over female participant (71%) as compared to the number of boys (29 %) while the problem was observed in both gender. Deficiency of "Vit - D" level was observed in 15 cases (4%) in female participants, out of total 11 % cases belonging to rickets cases in a study held at Tehran. A study in England showed that deficiency of vitamin D was the

reason behind the 14% total cases of rickets. Unfortunately, Pakistan is still a developing country and the people do not use foods protection as that of many developed countries do. In our study the participants were having same social and economic position and out of maximum were having same income resources. In our research concerning deficiency of vitamin D, it was highlighted that all the medical cases were in status of Deficiency of Vitamin D. It is suggested by the experts that the children in adolescents age (11 years to 18 years) must consume (400 IU) Vitamin D, (1200 mg) Calcium and (1200 mg) phosphorus in daily food routine. Although deficient level of serum vitamin D was observed in subclinical rickets cases but deficient level in nutritional limits (intake) was also found amongst all the participant children of our study irrespective of their normal or abnormal biochemical status. It is possible that synergistic effects and lower availability of sunshine could be the cause of the alteration in serum vitamin D. The major source of Vitamin D is sunlight in Asian foods higher rate of phytate content is present which has influences on

absorption of vitamin D and It is related with a study the bread contains phytate and also decreases the calcium absorption. In Our study approximation it was recorded that there was lower "Vit – D" value in (100%), (calcium deficiency in 55%), lack of (phosphorus 24%) and high (alkaline) phosphate deficiency 73% in subclinical cases. The poor contact to sunlight is not the major reason behind low vitamin D. Studies held at Africa and Bangladesh showed lower calcium level and elevated alkaline phosphate levels but normal levels of vitamin D value the same result were observed in a study on girls held at Tehran. Saudi children were observed in a study, lacking calcium level and high alkaline phosphate activity. Measuring Alkaline phosphate has little worth as a parameter to explore rickets as same results were deducted from another study. Actually Alkaline phosphatase level is best indicator for the disease and helps to assess rickets disease. Measuring blood Vitamin D is the most dependable device for diagnosing subclinical rickets. In our study level of hormonal parathyroid was found under the upper normal limits which was an interesting thing in the study. It could be due to normal phosphorus level. Vitamin D and parathyroid hormones were found in helpful link. At the end of a study it was decided that vitamin D level of (< 40nmol/l) was the major cause for the high parathyroid level. It was observed in a study of clinical rickets that Parathyroid hormonal value apparently raised from upside value in (vitamin deficiency) cases. In this study the deficiency of (synergistic effect of sunshine) and (vitamin D), can be the cause of irregular biochemical levels.

### CONCLUSIONS:

The big factor behind clinical rickets is deficiency of synergistic outcome of sunlight vitamin D and this disease is covered up (not apparent) amongst the school children. We suggest that higher officials should encourage health education through special courses for the information and benefits of sunlight and nutritional ingesting to compete the disease of subclinical rickets.

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