

A series of seven small yellow triangles pointing to the right, arranged in a slightly curved line across the upper portion of the slide.

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Recently, we are observing in our clinical practice that many patients who are coming with ***generalized body aches and pains***, not ***adequately responding to treatment***.



- ✓ When their vitamin D level was done, it was found to be **low** and
- ✓ correction of their low vitamin D level ***improved their symptoms dramatically.***

Despite abundant sunshine in Bangladesh,
*why our people are developing
hypovitaminosis D* struck our mind and
inspired us to do this current study.



- Vitamin D is a fat soluble steroid prohormone mainly produced **photochemically in the skin**.
- Only **10-20 %** of vitamin D is supplied through nutritional intake.



Almost **1 billion people in the world** suffer from vitamin D deficiency or insufficiency.

(1)

Objectives...



To determine the **prevalence** of hypovitaminosis D and its **association** with different socio-demographic population in adult patients of PMCH.

▸ methodology...



❖ **Study design:** Hospital based cross sectional study.

❖ **Study population:**

212 adult patients 18 years & above presented with generalized aches and pains attending inpatient & outpatient department of Medicine of PMCH



❖ ***Place of study:*** Inpatient and outpatient departments of Medicine of PMCH

❖ ***Period of study :*** March'16 - August 2016 (over a period of 6 months).

❖ ***Exclusion criteria:***

I. Age <18 years

II. Patients who were not willing to participate in the study

III. Patients who were taking vitamin D, Calcium with vitamin D or Multivitamins

IV. Individuals who suffer from chronic diseases that affect the absorption of Vitamin D such as chronic liver disease, kidney disease and other chronic diseases

V. Subjects who are taking drugs that could influence vitamin D as steroids & anti-epileptics

❖ *Vitamin D Analysis:*

- Serum 25(OH)D is considered the best functional indicator of vitamin D status **reflecting** the sum of cutaneous synthesis and oral intake ⁽²⁾.
- So, this level was measured by quantitative immunoassay.

- We classified participants as normal, vitamin D deficient and insufficient as per recently available literature ⁽³⁾.

25 Hydroxy vitamin D (25OHD) level (ng/ml)	Interpretation
≥ 30	Normal
21- 29	Insufficient
10-20	Deficient
< 10	Severely deficient

❖ *Statistical Analysis:*

- ✓ Association between vitamin D status & the individual specific variables was statistically analyzed using **SPSS 22**.






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- ✓ A total of **212 adult** patients were included in the current study.
 - ✓ The socio-demographic characteristics of the study population are shown in Table 1.

Table 1- Socio-demographic characteristics of the subjects:

Subject characteristics	Frequency (n) Total- 212	Valid Percent (%)
I. Gender distribution:		
a. Male	56	26.4
b. Female	156	73.6
II. Age distribution:		
a. 18-30 year	40	19
b. 31-50 year	82	39
c. 51-70 year	78	36
d. >=70 year	12	06
III. Religion:		
a. Islam	202	95.3
b. Hindu	08	3.7
c. Other	02	1.0
IV. Education		
a. Illiterate	17	8.0
b. Primary school	36	17.0
c. Secondary school	39	18.4
d. Higher secondary	42	19.8
e. Graduate or post graduate	78	36.8

Subject characteristics	Frequency (n) Total- 212	Valid Percent (%)
V. Occupation		
a. Unemployed	15	7.0
b. Housewife	131	61.7
c. Skilled worker	01	0.5
d. Small business	08	3.7
e. Large business	05	2.3
f. Service (indoor job)	32	15.1
g. Student	14	6.6
h. Others	06	2.8
VI. Socio-economic status		
a. Lower	18	8.4
b. Middle	180	85.04
c. Higher	14	6.5
VII. Locale		
a. Rural	54	25.4
b. Urban	158	74.5

Subject characteristics	Frequency (n) Total- 212	Valid Percent (%)
VIII. Skin complexion		
a. Fair	13	6.1
b. Brown	190	89.6
c. Dark	9	4.2
IX. Clothing style (Female)		
a. Wearing veil	101	64.7
b. Not wearing veil	55	35.3
X. Smoking Habit		
a. Smoker	06	2.8
b. Ex-smoker	10	4.7
c. Non smoker	196	92.4
XI. Transportation		
a. On foot	06	2.5
b. Rickshaw	162	76.6
c. Motor vehicle/ Bus	44	20.9

- The **prevalence** of Vitamin D insufficiency/deficiency among the study population was **100%**.

Table 2-: Vitamin D status among the study population (Range: 3.3- 29.0)

Vitamin D level (ng/ml)	Vitamin D status	Frequency (n)	Percent (%)
≥ 30	Normal	00	00
21- 29.9	Insufficient	09	4.2
10- 20.9	Deficient	147	68.9
< 10	Severely deficient	56	26.9

Vitamin D level

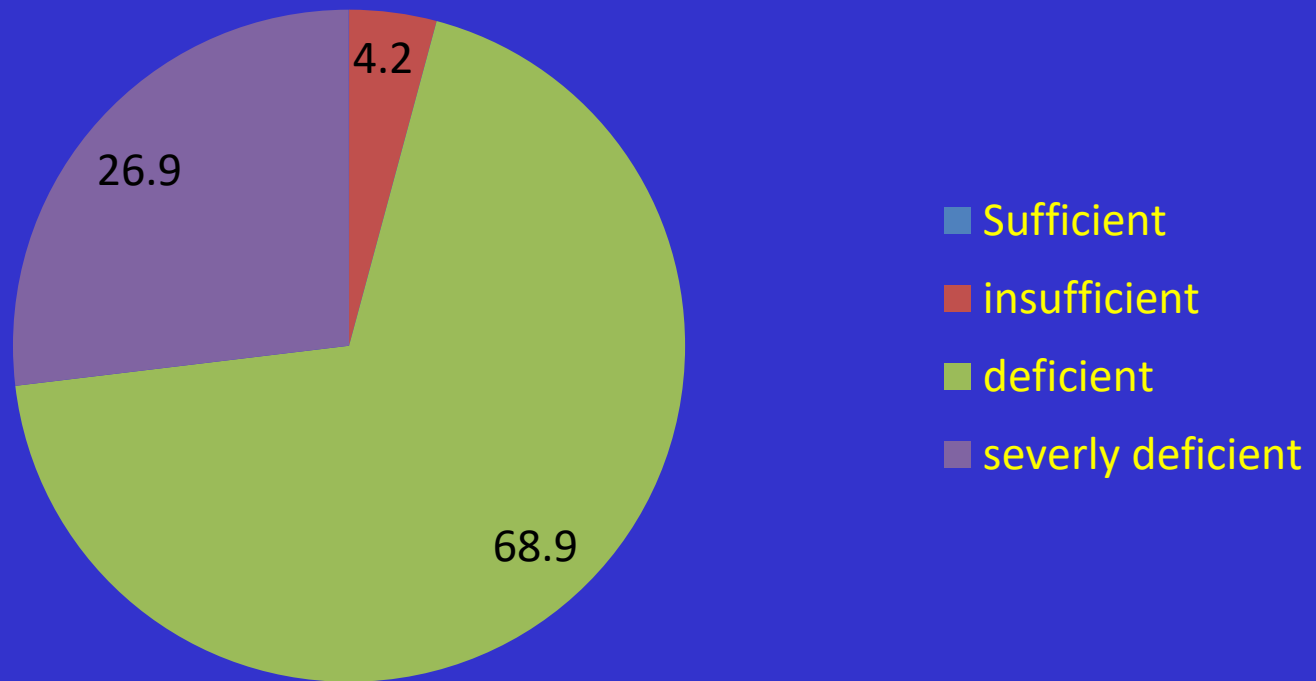
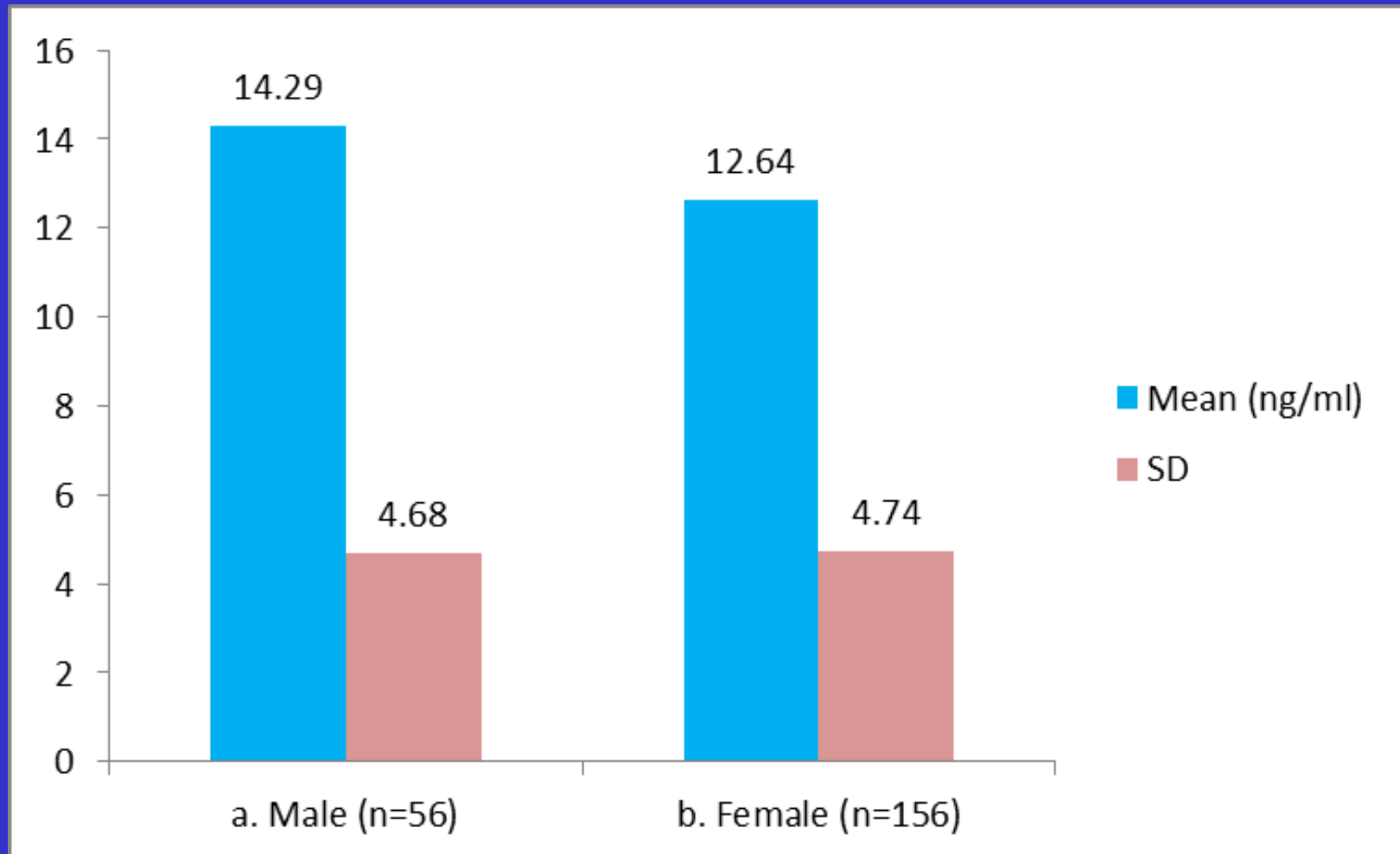


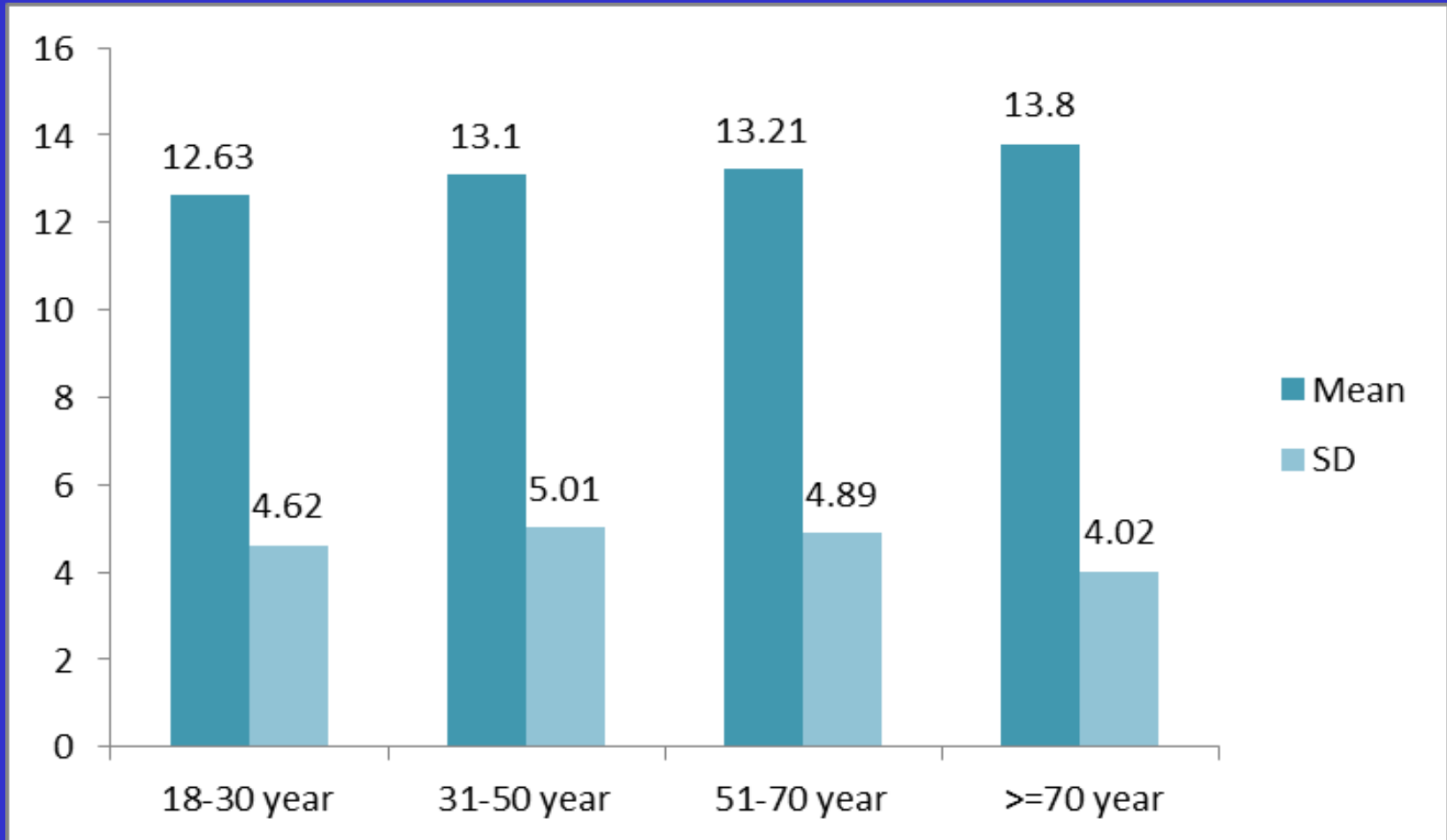
Table 3-Comparison of vitamin D levels with socio-demographic factors

Socio-demographic factors	Frequency (n)	Mean (ng/ml)	SD
Sex	a. Male (n=56)	14.29	4.68
	b. Female (n=156)	12.64	4.74
Age	a.18-30 year(n=38)	12.63	4.62
	b.31-50 year(n=80)	13.10	5.01
	c.51-70 year(n=76)	13.21	4.89
	d. >=70 year(n=12)	13.80	4.02
Socio-economic status	a. Lower (n=18)	15.0	3.67
	b. Middle(n=180)	12.74	4.92
	c. Higher(n=14)	14.0	4.35
Location	a. Rural (n=54)	15.20	4.50
	b. Urban (n=158)	12.33	4.58
BMI	a. Normal (n=98)	13.55	5.12
	b. Underweight (n=14)	12.82	4.21
	c. Overweight (n=70)	13.19	4.41
	d. Obese (n=30)	11.10	4.71

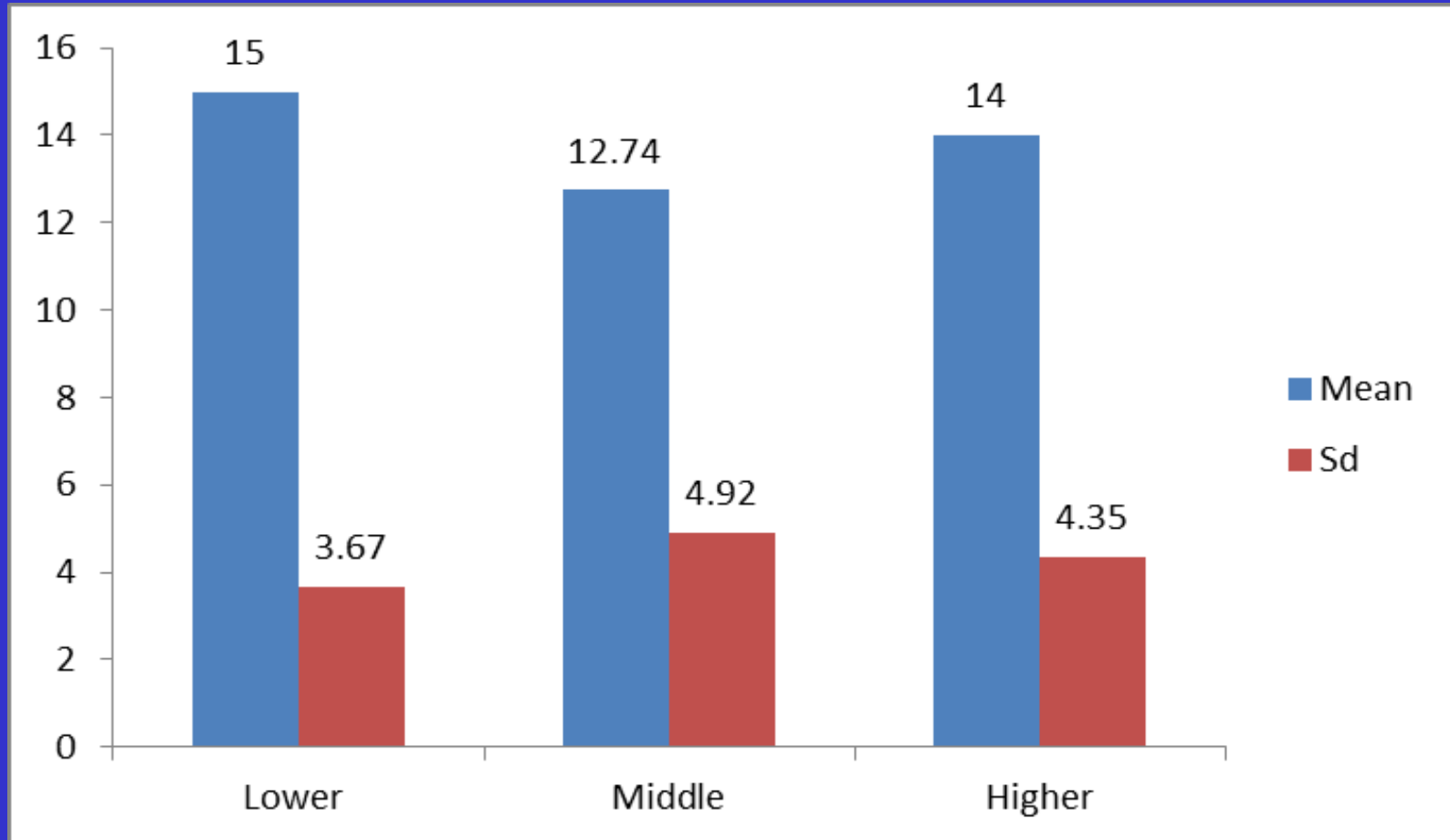
Gender distribution of Vitamin D level



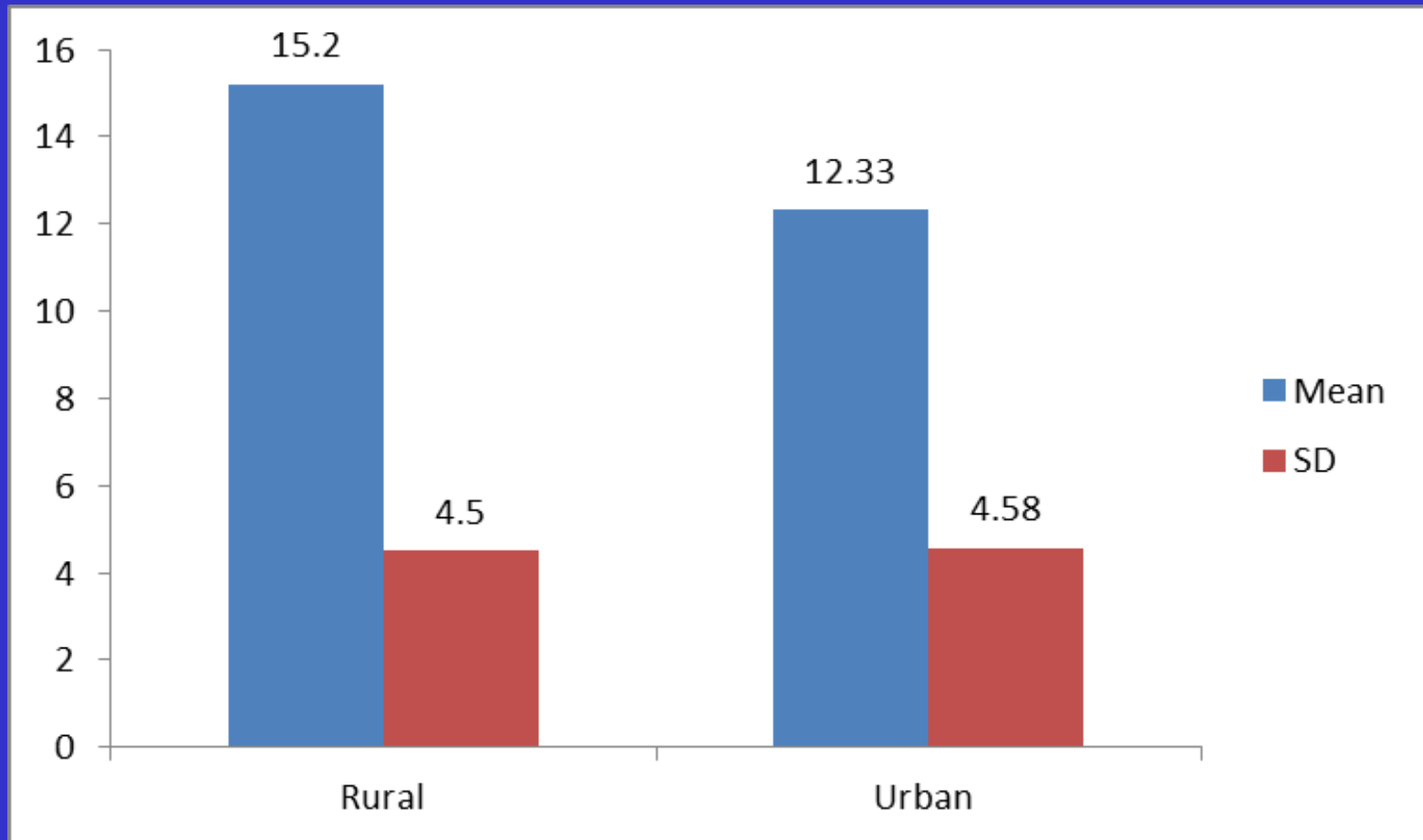
Vitamin D level in different Age group



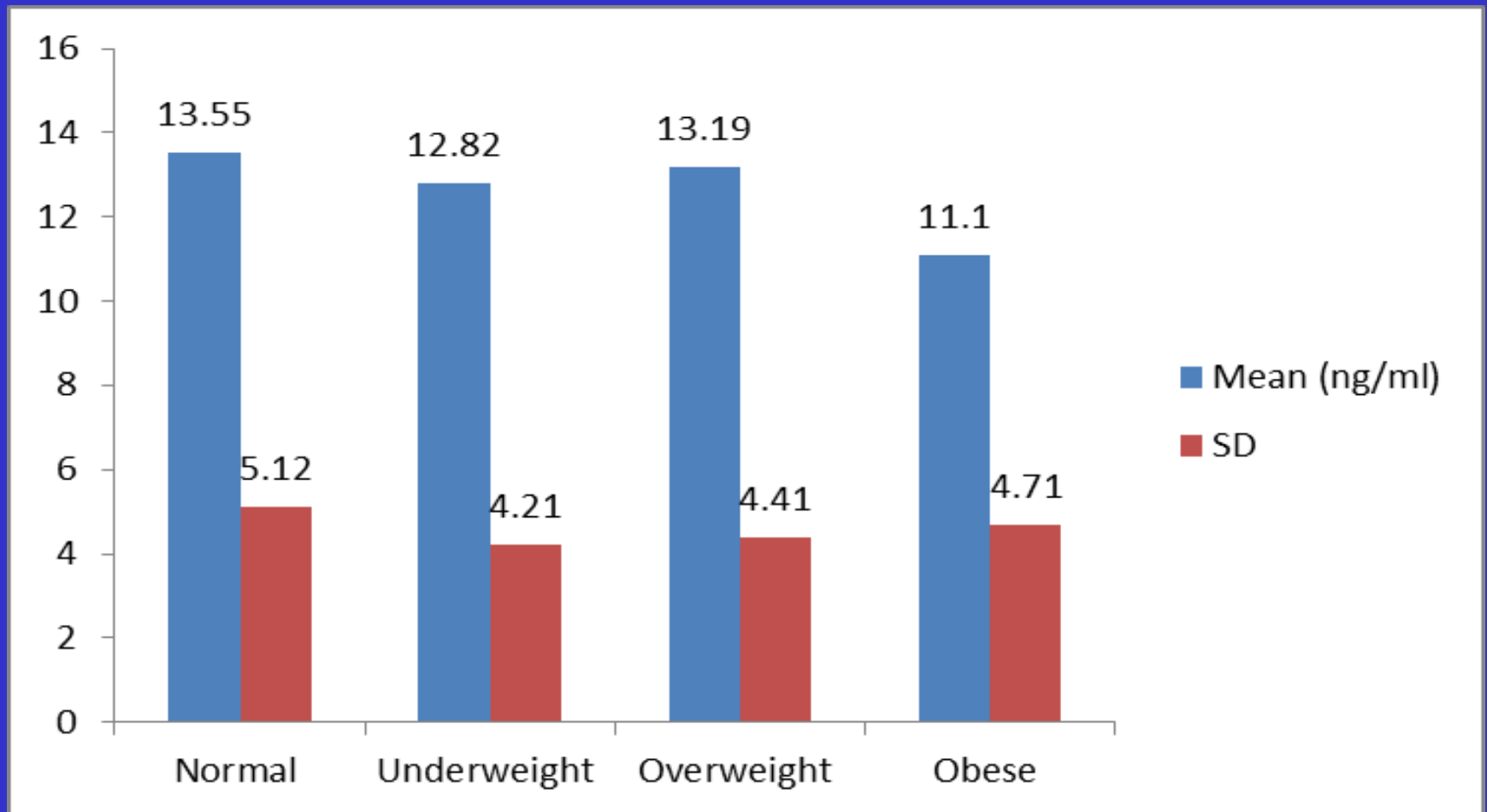
Vitamin D level in different Socio-economic status



Vitamin D level in different locale

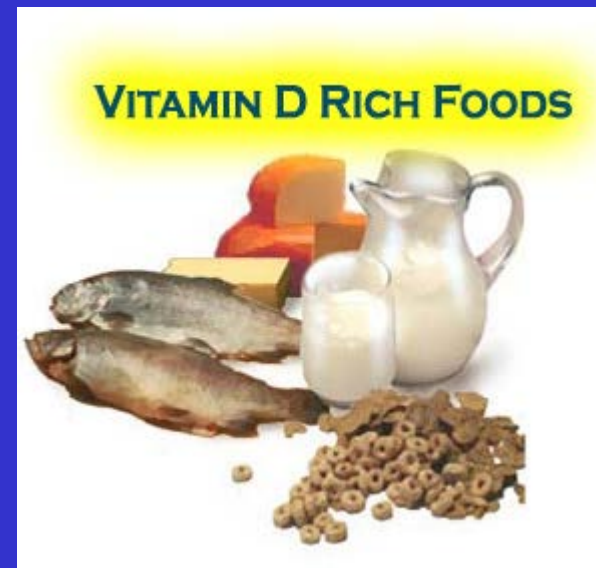


Vitamin D level in different BMI



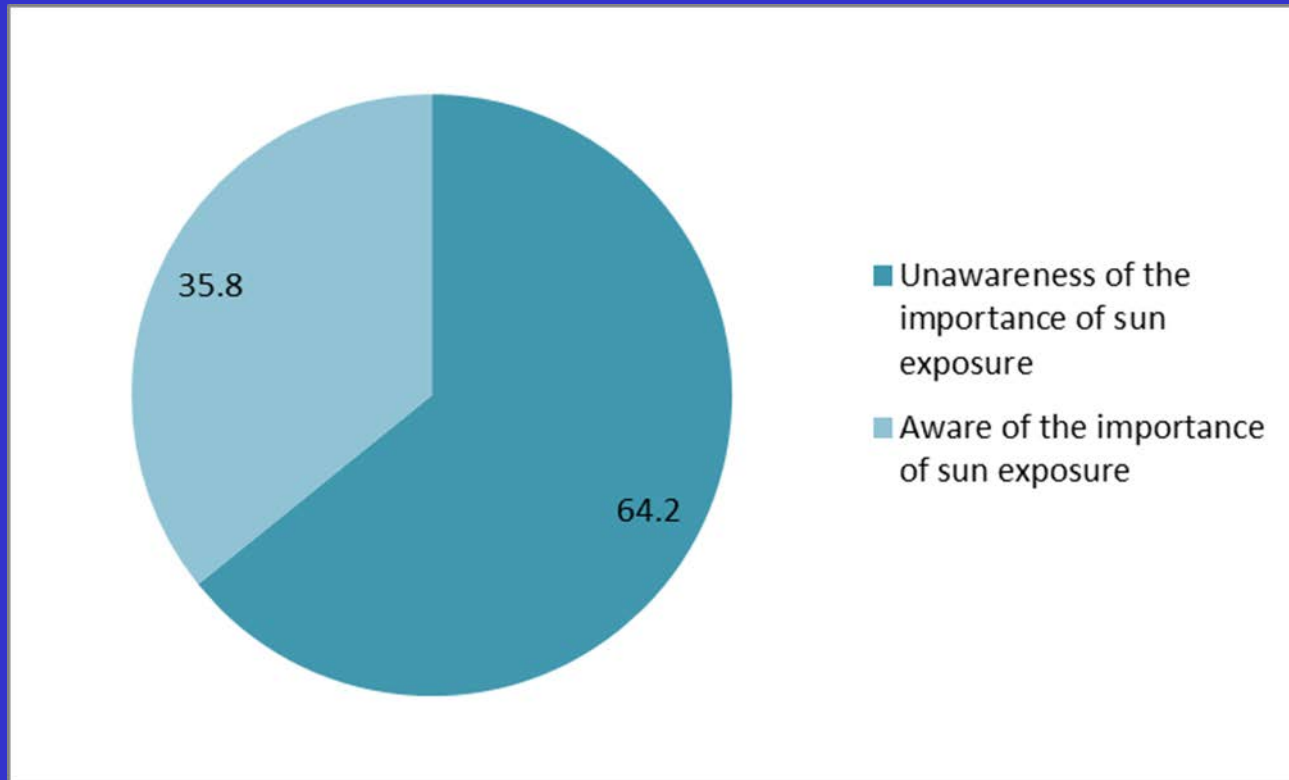
- The mean difference between normal and obese population was statistically significant (p value 0.007).
- This indicates obesity is an independent risk factor for hypovitaminosis D.

- All our study subjects were consuming vitamin D enriched food like eggs, fish, milk (except cheese) in different proportion & amount.
- So, food was not an important determinant of hypovitaminosis D in our study.



Awareness of the importance of sun exposure

- One of the most striking findings from our study is the **unawareness** of the importance of sun exposure among **two-third** of our study population (64.2%).



- If this issue is not addressed properly by public health awareness program, the huge burden of hypovitaminosis D cannot be combatted.



- People living in Bangladesh live at a latitude that supports cutaneous vitamin D synthesis all the year round, still vitamin D insufficiency among our study population is **100%**.
- Some studies & numerous anecdotal observations report vitamin D deficiency in 80% to 90% of patients with pain, myalgias & weakness. ⁽⁴⁾

- Mean vitamin D level among male was 14.29 & female was 12.64. So, though both the values are low, mean vitamin D level of males are higher than that of females.
- Lack of sun exposure due to staying inside home (61.7% housewives) and wearing skin covering veils (64.7% of our female study group wearing veils) are contributing to this low vitamin D levels in females than males.

- In our study, hypovitaminosis D was found in all age groups. Highest percentage of severely deficient vitamin D level (<10ng/ml) was found in 31- 50 years of age (37.5%).
- The result is somewhat unexpected since an inverse association between 25OHD and age has been shown in several previous large population based studies ⁽⁵⁻⁷⁾.
- Our active working age group are suffering from severely low vitamin D level **possibly due to lifestyle factors** is a striking finding of our study.

- **About 94%** of our study population were having brown to dark skin complexion. This skin tone with high melanin pigment (natural sunscreen) produces significant lesser amount of vitamin D ⁽⁸⁾.

- We found an **inverse** association between Vitamin D level & BMI, which has been seen in many other studies worldwide ⁽⁹⁻¹¹⁾ .
- With data from the US 'National Health and Nutrition Examination Survey' (NHANES) Forrest et al. 2011 demonstrated that the risk of having serum 25(OH)D levels <50 nmol/l was about **2 times higher in obese than non-obese persons** ^[12] .
- Daly et al. 2012 described that in obese men and women adjusted serum 25(OH)D levels were 8.3–9.5 nmol/l lower than in persons with normal weight ^[13] .

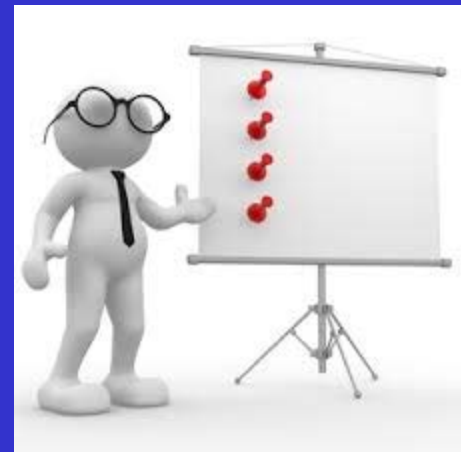
- The reasons for the observed lower levels of serum 25(OH)D among person with higher BMI are still unclear. There is some evidence that **vitamin D is accumulated in adipose tissue with decreased bioavailability and lower serum levels in persons with higher BMI** ^[14] .

▶ **imitations...**



- The study sample 212 was **small**.
- It was a Private Medical College Hospital based study, so sample **might not be representative** of the total population of our country.
- Blood samples were collected **only once** , so cannot reveal **the seasonal variation**.

onclusion ...




- Despite abundant sunlight in Bangladesh, the prevalence of vitamin D deficiency among adult patients presenting with generalized aches and pains is found to be **100%** across all age groups & both sexes.

- Some of the important factors associated with hypovitaminosis D in Bangladesh are-
 - ✓ Female gender
 - ✓ urbanization
 - ✓ obesity
 - ✓ dark skin complexion
 - ✓ wearing skin covering veils
 - ✓ lifestyle factors (staying inside home/ office/ car-lack of sunlight exposure)

- Two-third of our study population were unaware about the importance of sun exposure.

\ecommmendations...



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- ❖ From the findings of our study, we strongly recommend to **screen for** vitamin D deficiency who **are at risk, as features of hypovitaminosis D are mostly reversible with proper replacement.**
 - ❖ We also recommend **public health efforts** in Bangladesh to increase the **awareness** about the importance of sun exposure.

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Thank you!