



STUDY OF SERUM VITAMIN D AND CALCIUM IN AGE RELATED MACULAR DEGENERATION (ARMD)

Biochemistry

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ABSTRACT

Objective: The study was undertaken to determine the serum vitamin D and Calcium level in Age Related Macular Degeneration and to evaluate their correlation in the occurrence of ARMD. Vitamin D and Calcium level were estimated by ELISA and Autoanalyser (VITROS 5600) respectively. **Methods:** The case control study was carried out on 60 persons, 30 diagnosed case of ARMD and 30 healthy individuals without any ocular or medical pathology. After estimation of serum vitamin D and calcium , results were evaluated with proper statistical tools. **Results:** Vitamin D and calcium were estimated in both case and control groups. After comparing the results correlation of their levels in both case and control group were estimated. Correlation between vitamin D and calcium along with correlation between vitamin D and BMI were also estimated. **Conclusion:** Serum vitamin D was found decreased in all cases , serum calcium was also correlated positively with ARMD but not significant. Strong and good correlation was found between serum vitamin D and BMI .

KEYWORDS

Age related macular degeneration, vitamin D, Calcium

INTRODUCTION

Age related macular degeneration (ARMD) is a common eye condition and a leading cause of loss of vision among elderly people of age 40 and above¹ . It causes damage to the macula, a small spot near the centre of the retina and the part of the eye that needed for central, sharp vision. It progresses very slowly and need a long time to cause vision loss. But ARMD itself never cause complete blindness.

According to WHO, ARMD is a condition affecting older people, and it involves the loss of person's central field of vision . It occurs when the macular (or central) retina develops degenerative lesions . It is thought that circulatory insufficiency with reduction in the blood flow to the macular area , also plays a part . Globally ARMD ranks third as a cause of blindness after cataract and glaucoma . It is the primary cause in industrialized countries . The main risk factor is ageing² .

Historically , Hutchinson and Tay were probably the first ophthalmologists in the English Literature to describe in 1875 what is presently called ARMD, when they described the symmetrical fundal changes in senile patients³. However in 1885, ARMD was recognised, as discrete clinical entity by OTTO HAAAB and he called it "Senile Macular Degeneration, (SMD)"⁴. Various names have been used over the years for SMD (Ryan S, 1980) with age related maculopathy (ARM) and ARMD being the term used today⁵.

ARMD is a leading cause of severe irreversible vision impairment in developed countries, but its progression to advanced stage of ARMD is approx. 6 only 25 % in 5 years duration. In 2004 examining a slightly expanded age group, it was estimated that approximately 1.75 million people aged 40 years or older in US were estimated to have either neovascular ARMD or geographic atrophy in at least one eye and 7.3 million were considered to have high risk features like large drusen (>125 μ m) . Overall ARMD is associated with almost 32.5% of cases with depressive disorder⁶.

A diet rich in vitamin D₃ may prevent or delay in progression to advanced ARMD, specially Neovascular ARMD⁹. Low level of vitamin D status are more likely to have the disease. Vitamin D has a protective role in reducing visual loss. ARMD is also associated with calcium consumption. Self-reported supplementary calcium consumption is usually associated with prevalence of ARMD¹⁰. The stronger association in older individuals may be due to relatively longer duration of calcium intake. Moreover the protective role of

vitaminD is also primarily driven by dietary calcium intake .

MATERIALS AND METHODS

This study was done in Department of BIOCHEMISTRY in collaboration with Regional Institute of Ophthalmology (RIO) and Department of MICROBIOLOGY.h

TYPE OF STUDY :: Hospital based study

STUDY DESIGN :: Case control study The target subjects were divided into two groups

1. Case group :: This group included thirty patients with clinically confirmed diagnosis of ARMD.
2. Control group :: This group included thirty age and sex matched healthy individuals without having ARMD

STUDY PERIOD :: JULY 2018 to JULY 2019 Weight, height and BMI are measured in both the groups .

Laboratory investigations done ::

1. Serum vitamin D: This EIA (Enzyme Immuno Assay) kit is designed , developed and produced for the quantitative measurement of total 25-OH Vitamin D 2/3 in serum utilizing the competitive immunoassay technique . This assay utilizes a monoclonal antibody that binds to both 25-OH Vitamin D₂ and 25-OH Vitamin D₃ equally.
2. Serum calcium :: Calcium was estimated by OCP (O-Cresol phthalein complexones) .

Principle :: Calcium in an alkaline medium combines with o-cresolphthalein complexone to form a purple coloured complex. Intensity of the colour formed is directly proportional to the amount of calcium present in the sample.

RESULTS AND OBSERVATION

The present study was carried out in Gauhati Medical College & Hospital from July 2018 to July 2019 . In this study 30 (thirty) newly diagnosed cases of ARMD seeking medical help in the department of Ophthalmology , Gauhati Medical College & Hospital were studied and they were compared with 30 (thirty) age and sex matched healthy controls during the same period.

AGE DISTRIBUTION OF SUBJECTS OF THE

GROUPS STUDIED :: Subjects are divided in five groups depending

on different age groups depicted as in table no 1..The groups comprises of age between 35 to 85 years. In the case group, 56 - 65 years with relative frequency 0.33 and in the control group, maximum subjects were belongs to 66 – 75 years of age group with a relative frequency of 0.40 .

TABLE 1 :: AGE DISTRIBUTION ON THE STUDY GROUPS

age	Case			control		
	freuquency	%	Relative frequency	freuquency	%	Relative frequency
35-45	2	7	0.07	0	0	0
46-55	6	20	0.20	6	20	0.20
56-65	10	33	0.33	10	33	0.33
66-75	7	23	0.23	12	40	0.40
76-85	5	17	0.17	2	7	0.07
total	30	100	1.00	30	100	1.00

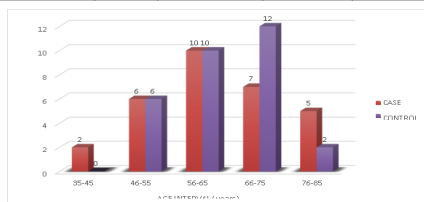


FIGURE 1 :: frequency distribution of subjects by age in the study groups

SEX DISTRIBUTION OF SUBJECTS OF THE GROUPS STUDIED

Out of total number of subjects in the test group, 17 (57 %) are male and 13 (43 %) were female and in the control group, 21 (70 %) are male and 9 (30%) were female .

TABLE 2 :: SEX DISTRIBUTION ON THE STUDY GROUPS

	CASE	CONTROL
SEX	NUMBER (%)	NUMBER , %
MALE	17 (57)	21 (70)
FEMALE	13 (43)	9 (30)
TATAL	30	30

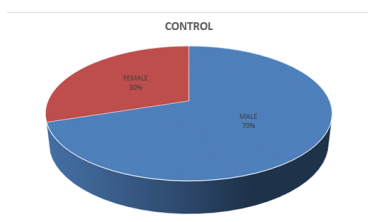


Figure 2 :: Pie diagrams showing sex distribution in the study groups

BODY MASS INDEX (BMI) IN THE STUDY GROUPS

The mean body mass index of the control group was 20.1 kg/m² with a standard deviation of ± 3.462 kg/m² and that in the case group was 28.2 kg/m² with a standard deviation of ± 1.931 kg/m² .

VITAMIN D IN ALL SUBJECTS OF THE GROUPS STUDIED VITAMIN D (ng/ml)

The mean vitamin D of the case group was 11.6 ng/ml and that in the control group was 37.7 ng/ml . In unpaired t test between case and control groups, the two – tailed P value is < 0.001, which is extremely significant.

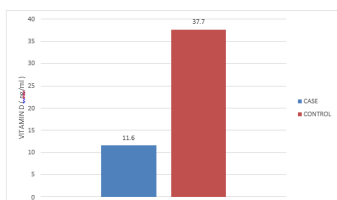


Figure 3:: comparison of mean vitamin D in the study groups

CALCIUM IN ALL SUBJECTS OF THE GROUPS STUDIED

The mean calcium value of the case group was 8.5 mg/dl and that of control group was 8.9 mg/dl . The difference between the two groups in Unpaired t test were not significant (p > 0.05) .

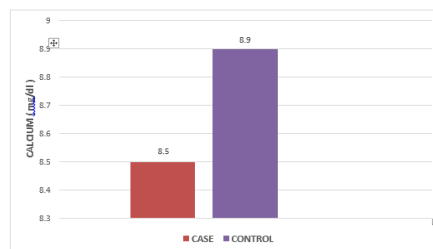


Figure 4:: comparison of mean calcium in the study group

CORRELATION BETWEEN SERUM VITAMIN D

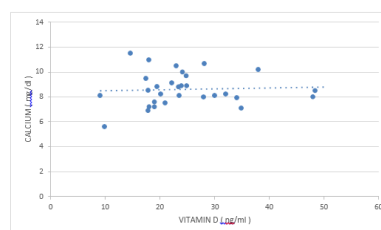


Fig 5 ::scatter diagram showing correlation between vitamin d and calcium

Pearson 's correlation coefficient (r) = 0.510 Coefficient of determination (r²) = 0.2601 two tailed p value < 0.0001 , considered significant. Diagram suggests that there is significant ,good ,positive correlation between vitamin D and calcium of case group.

CORRELATION BETWEEN VITAMIN D AND BMI

Pearson's correlation coefficient (r) = 0.6703 Coefficient of determination (r²) = 0.448 Two tailed p value < 0.001, which is significant.

Diagram suggests that there is a significant positive, strong correlation between vitamin d level and BMI of the case group.

DISCUSSION

AGE

This study was conducted to determine the serum level of both vitamin D and calcium in diagnosed case of ARMD along with to know the association of both the parameters in occurrence of ARMD. Here , 30 cases and 30 healthy controls were taken . Serum level of vitamin d and calcium were estimated. All previous studies demonstrate that the prevalence and incidence of ARMD increases with increasing age. In our study, the age of the ARMD patients and controls were in the range of 35-85 years of age. Maximum number of patients were in the age group interval of 56-65 years of age, which was 33 % of all ARMD cases studied.

GENDER

There were slight increase in no of cases in male in comparison to female.

BODY MASS INDEX

In our study mean BMI of the case group was 28.2 kg/m² and that of the control group was 20.1 kg/m² In unpaired t-test two tailed p- value was found > 0.001, which is significant.

Serum vitamin d level and BMI of the cases are also studied and it is found that there is a strong, positive significant correlation between them in the case group.

VITAMIN D

From our study it was observed that mean VITAMIN D of the case group was 11.6 ng/ml and that of control group was 37.7 ng/ml with unpaired two tailed p value is < 0.001, which is significant. So, it was

clearly found that there was more prevalence of ARMD in patients with lower vitamin d level.

Calcium

In our study, mean calcium in case and control are 8.5mg/dl and 8.9 mg/dl respectively. Unpaired two tailed p value (>0.001) is not significant. It suggests that there was no such significance between calcium level and ARMD

Relation of vitamin D with calcium

Serum Vitamin d and calcium relation was studied in the case group and it is found that there was a significant, good and positive correlation between the two parameters .

CONCLUSION

ARMD is a multifactorial disease that affects a large segment of the population and research till date has yielded some preventive measures but few effective treatment. Our study aimed at finding the serum level of vitamin D and Calcium in ARMD along with their association in occurrence of the disease .

From our study , we conclude that emphasis should be put on early screening of ARMD patients , and change of dietary habits and lifestyle modifications . This could help them in reducing the risk of morbidity .

A limitation of the present study is the small sample size and inability to follow up the subjects. Study of progression of the condition is not possible in the present circumstances due to paucity of time and limited resources . Hence , it is hoped that the findings of the present study will encourage further studies on the present topic on a larger scale in future Adequate control of the risk factors and timely diagnosis followed by proper treatment will definitely pave the way for a world with less number of Age Related Macular Degeneration (ARMD) .

FINANCIAL DISCLOSURE : No grant or financial aid availed

ETHICAL CLEARANCE : The study was approved by the Institution Board of Ethics .

CONSENT : Written and informed consent was obtained from the patients as well as the control .

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