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Vitamin D in Different Stages of Gastric Cancer

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ABSTRACT

The purpose of this study is to investigate the diagnostic value of Vitamin D in different stages of Gastric cancer. Gastric cancer is the fourth most common cancer and the second leading cause of cancer-related deaths following lung carcinoma despite a worldwide decline in both incidence and mortality since the later half of the twentieth century Design/Methods: Gastric cancer patients were selected on the basis of stages of cancer. In this study, we demonstrated that serum vitamin D levels very helpful monitoring for different stages of Gastric cancer. Results: The levels of Vitamin D were found to be significantly decreased in different stages of Gastric cancer when compared with control Conclusions: Vitamin D as a steroid hormone. Its serum concentrations in healthy individuals positively correlate with Gastric cancer.

KEYWORDS : Vitamin D, Gastric cancer

Introduction

Gastric cancer (GC) is the second leading cause of cancer-related mortality worldwide, with an estimated 989,600 new cases and accounted for 738,000 deaths in 2011 [1]. Despite the decrease in overall incidence, the total survival rate for GC patients did not improve significantly over the past two decades [2]. The only potentially curative treatment for GC is surgery, but only about 20–40% of patients can undergo radical resection. GC have become the main contributors to the total cancer burden in many parts of Asia [3]. Effective primary prevention strategies for GC, especially vitamin intake, have drawn considerable attention. For example, vitamins have been reported to play an important role in the prevention of GC in many studies[4]. Some in vitro studies have also suggested that vitamins may prevent GC through different processes, such as scavenging the concentration of nitrite in the stomach, reducing oxidative stress, and inhibiting nitrosation.

Vitamin D is a secosteroid hormone critical to skeletal health and other biological pathways [5]. Vitamin D_3 is the natural form of vitamin D produced in skin through ultraviolet irradiation of 7-dehydrocholesterol. It is biologically inert and must be metabolized to 25-hydroxyvitamin D_3 in the liver and then to 1,25-dihydroxyvitamin D_3 (VD3) in the kidney before functioning. Earlier studies showed that 1,25-dihydroxyvitamin D_3, the physiologically active form of vitamin D, could induce differentiation and cell cycle arrest in a number of malignant cells, including those in myeloid leukemia, and breast, prostate, colon, skin and brain cancer [6].

A number of studies have been done to prove whether vitamin D has the preventive function to various kinds of cancers. Results were debatable, and consistent associations have only been demonstrated in colorectal cancer [7,8]. The Cohort Consortium Vitamin D Pooling Project of Rarer Cancers have suggested that circulating 25(OH)D concentration was not significantly associated with upper GI cancer risk, but analysis on race subgroup in that study showed that among Asians, lower concentrations of 25(OH)D were associated with a statistically significant decreased risk of upper GI cancer [9]. A prospective study built an index from factors that predicted higher vitamin D status was statistically significantly associated with a lower risk of esophageal cancer and non-statistically-significantly with a lower risk of stomach cancer [10].

Materials and Methods

Chemicals:

Vitamin D kits were purchased from immune Diagnostic kits, USA. All the other chemicals used were of analytical grade.

IIb. Experimental Design

Out of 44 patients were divided in to six groups. Group I : Normal subjects, Group-II : Stage-0 Gastric cancer, Group-III: Stage-I Gastric cancer, Group-IV: Stage-II Gastric cancer, Group-V: Stage III Gastric cancer and Group-VI: Stage IV Gastric cancer patients. Patients demographic data, including sex, age, and risk factors for cancer events including high-risk age (49-64), smoking history, histopathological record, were recorded.

The study was conducted during the period of December 2015 to August 2016 in department of Biochemistry, Ponnayah Ramajayam institute of Medical Science, Kanchipuram District, Tamil Nadu. India.

III. Statistical Analysis

Data were analyzed using the SPSS software package, version 17.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed using range, mean, SD, and median, whereas qualitative data were expressed as frequency and percentage. P value was assumed to be statistically significant at 0.05.

IV. Results

Study Participants

The demographics, histological cell type, and stage of Gastric cancer of the 22 patients including 6,16,2,3 and 7 of cancer patients were Stage 0,stage I, stage II, stage III and stage IV type of gastric cancer respectively. The percentage of gastric cancer stage-0, stage-I, stage-II, stage-III and stage –IV levels in the groups are 18%, 47%, 5.9%, 8.8% and 20.5% respectively.

Particulars	Con trol	Stage-O Gastric cancer	Stage-I Gastric cancer	Stage-II Gastric cancer	Stage-III Gastric cancer	Stage-IV Gastric cancer	P valve
Number of participants	22	2	10	2	3	5	
Percentage of participants	50%	4.5%	22.7%	4.5%	6.8%	11.4%	
25(OH)D	36.04±3.7	29.70±3.10	23.11±2.4	18.82±1.8	10.44±1.1	07.02±0.70	0.000*[a,b]

A-Comparison between control subjects and Stages of lung cancer
B-Comparison between stage 0 lung cancer and other stage lung cancer groups
P< 0.001 is considered significant

The observed results in Table 1 clearly reveals that 4.5% (n=2) of the participants were found to have Vitamin D levels between 28-32ng/ml (Stage 0) and 22.7% (n=10) of the participants were found to have Vitamin D level <26 ng/ml (Stage-I) and 4.5% (n=2) of the participants have Vitamin D level <20ng/ml (Stage-II) and 6.8% (n=3) of the study participants have Vitamin D levels between 10-12ng/ml and 11.4% (n=5) of the study participants have Vitamin D levels below 9.0ng/ml and also 50% (n=22) of the study participants have Vitamin D levels between 34-40ng/ml. The observed mean Vitamin D status of Normal subject, Stage-O, Stage -I, Stage-II, Stage-III and Stage-IV students were 36.04±3.7, 29.70±3.10, 23.11±2.4, 18.82±1.8, 10.44±1.1 and 07.02±0.70 respectively.

In this present study shows that concentration of vitamin D levels were significantly (p<0.001) increased in Normal subjects when compared with different stages of Gastric cancer. Vitamin D levels in Stage-0 group-II gastric cancer patients were compared with Stage-I, Stage-II, Stage-III and Stage –IV groups were significantly (p<0.001) increased. The concentration of Vitamin D levels in Stage –IV (Group-VI) gastric cancer patients have highly significantly decreased when compared with group-I control normal subjects.

Discussion:
A number of factors, including regional UV-B levels, vitamin D intake, skin pigmentation, sunlight exposure behaviors, and adiposity may influence in vivo vitamin D levels. Seasonal variation in 25(OH)D concentrations have been observed for residents in Boston, with inadequate vitamin D intake and winter season being independent predictors of hypovitaminosis D[8]. We investigated the effects of season and vitamin D intake on gastric cancer survival, and found that both higher UV-B exposure (patients who had surgery in summer) and higher vitamin D intake (diet and supplement) improved gastric cancer survival.

Vitamin D deficiency has long been recognized as a medical condition characterized by muscle weakness, ostealgia and fragility fractures. Vitamin D insufficiency without overt clinical symptoms has recently become a concern of physicians and patients. Generally, vitamin D deficiency refers to a serum level of 25-hydroxyvitamin D below 50 nmol/L, and vitamin D insufficiency 50 to 75 nmol/L.

Earlier studies showed that 1,25-dihydroxyvitamin D_3, the physiologically active form of vitamin D, could induce differentiation and cell cycle arrest in a number of malignant cells, including those in myeloid leukemia, and breast, prostate, colon, skin and brain cancer. VD3 can be antiproliferative in cells of the skin, colon, breast, and prostate, among others, and may also limit proinflammatory stresses. Functional vitamin D receptor (VDR) elements have been identified in the promoter of PTEN, suggesting that vitamin D may play a role in the regulation of PTEN expression [11]. Moreover, it had been demonstrated that VD3 significantly promoted apoptosis in the undifferentiated gastric cancer cell line HGC-27, which was accompanied by a concurrent increase in phosphatase and tensin homolog deletion on chromosome 10 (PTEN) expression with VD3 treatment [12].

Another study found that higher serum 25(OH)D concentrations were associated with increased risk of esophageal squamous cell carcinoma (ESCC) in men, but not gastric cardia or noncardia adenocarcinoma [13]. Case-control studies of upper GI cancer examining dietary and/or supplemental vitamin D have reported that higher vitamin D intake is associated with lower risk of ESCC [14], increased risk of gastric cancer [15], or had no association with gastric cancer. However, three studies which used different methods more available solar radiation in lower latitudes, higher vitamin D intake and higher vitamin D exposure index [16]to estimate vitamin D exposure unanimously showed higher vitamin D levels were associated with lower risk of gastric cancer.

Conclusion:
In the present study results should be confirmed in a prospective study to assess the serum vitamin D levels at time of surgery. If the results are confirmed, our results, combined with findings in other studies, suggest that dietary vitamin D supplementation may be advisable for early stages of gastric cancer patients, particularly during the winter season and in groups that tend to be deficient in vitamin D.

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