



DEMOGRAPHIC STUDIES ON NORTH COASTAL ANDHRA PEOPLE WITH SOLID CARCINOMAS AND CORRELATION WITH SEAFOOD INTAKE- A PROSPECTIVE INTERVENTIONAL STUDY

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ABSTRACT

Cancer is a disease in which abnormal cells divide without control and can invade nearby tissues. There is an ambiguity showing positive and negative correlation between excessive seafood intake and cancer incidence. The present study was done in two major hospitals with 3120 cases and observed for seafood intake and its correlation with cancer incidence. Among 3120 cases, males were 1718 and females were 1420 cases. The study observed the cases of 1640 that were living nearer to coastal region and 1480 cases were far from coastal region. Better recovery status was observed when compared to the worsening status. The dietary score range of 0 to 5, 6 to 10, 11 to 15 and 16 to 20 consisting of 550 cases (17.66%), 295 cases (9.45%), 950 cases (30.44%) and 1325 cases (42.66%).

More number of male cases was seen in relation with lung and prostate cancer incidence and a greater number of female cases were seen in relation with breast cancer and incidence in relation with gastric, colorectal, and gastro-esophageal carcinoma, both males and females were almost equally diagnosed. Males were more prone to lung carcinoma having risk factors of excessive smoking and voracious eating of salted and smoked fish, which both have carcinogenic substance like nitrosamines (N,N-diethyl amine / N,N-dimethyl amine). Positive correlation was observed with excess intake of salted fish/smoked fish and breast cancer incidence and no correlation was observed with crab intake, prawn/crab intake with breast cancer.

Keywords: Cancer, coastal region, gastric carcinoma.



INTRODUCTION

DEFINITION: Cancer is a term for diseases in which abnormal cells divide without control and can invade nearby tissues. Cancer cells can also spread to other parts of the body through the blood and lymph systems. There are several main types of cancers. Carcinoma is a cancer that begins in the skin or in tissues that line or cover internal organs. Sarcoma is a cancer that begins in bone, cartilage, fat, muscle, blood vessels, or other connective or supportive tissue. Leukemia is a cancer that starts in blood-forming tissue, such as the bone marrow, and causes large numbers of abnormal blood cells to be produced and enter the blood (Ghadimi, R., et. al. 2008). Lymphoma and multiple myeloma are cancers that begin in the cells of the immune system. Central nervous system cancers are cancers that begin in the tissues of the brain and spinal cord also called malignancy (Azeem S., et. al., 2015).

A peep into the literature indicates that eating fish and fish oil has beneficial activity in reducing cancer incidence. Similarly eating plenty of fruits, vegetables and exercise are indicated to have positive correlation with the reduction in cancer. However, a few studies indicate that eating salt/salted fish or grilled fish has increased the incidence of cancer in Japanese population while fish intake is positively correlated with breast cancer in Denmark and diets rich in animal food increase endometrial cancer in Shanghai (Alperovich. Et. al., 2007). Such controversial findings suggest further research in this area. Unlike the people that live in the rest of the world, Indians have varied food habits and culture. Some sections of people are pure vegetarians while some take vegetarian and non vegetarian food. Among the later group some depend mostly on sea foods (fish) due to their occupation and easy availability. This type of varied food habits helps to find whether fish intake has low incidence of cancer among those people compared to their

other counter parts who take fish and other non-vegetarian foods (Virtanen, et. al., 2008). Similarly such populations can be compared with populations that take vegetarian diets only. Such demographic study helps to clarify whether the suppositions are correct or false. Further its helps to find the Indian scenario with respect to diet habits and their relation with the incidence of cancer. Further there is no clarity between prawns consumption and cancer incidence. The observation of few cases appears to be positively correlated with prawn consumption and incidence of lung cancer to get more clarity (Chavarro et. al., 2008). The study reveals the fish eating is really beneficial or not, if so more beneficial than vegetarian foods or not. The outcome of the study helps to suggest the diet to be taken to reduce cancer incidence.

MATERIALS AND METHODOLOGY

Study Site: This research study was conducted at Radiotherapy department, King George Hospital and Mahatma Gandhi cancer hospital and research institute in Visakhapatnam which provides all facilities & health care services to people in and around Visakhapatnam.

Study design: The study is an Interventional, Descriptive and Experimental design consisting of 3120 patients (sample size).

Study Population: Inclusion criteria: Males, females, children, adults, elders in the age group of 20-80 years who were diagnosed with solid carcinomas of lung, stomach, colorectum, breast, prostate carcinoma and gastro esophageal carcinomas.

Exclusion criteria: The patients below the age of below 20 years and above age of 80 years, patients diagnosed with other cancers were excluded in the study.

Duration of study: 2 years.

Data Collection: Samples were selected by following Non-Probability Quota sampling Method.

Sources of data collection: Qualitative data is collected through clinical records (case report forms), other personal records, laboratory investigation reports and personal interviews using flexible Structured Questionnaires.

Ethical Considerations: Ethics Committees of King George Hospital and M.G. cancer hospital have reviewed and verified all documents related to Research proposal, Informed Consent, budget and granted approvals in the Ethics Committee and given proposal numbers. The study mainly concentrated on 685 breast cancer cases from KGH and M.G. cancer hospitals and all those cases were histopathological diagnosed as breast cancer cases and obtained informed consent form from all the patients after explaining clearly about the study. Population based controls were selected from other departments as 1 (or)

2 controls for each case after checking for the match for ethnicity and age. Data collected from controls same as like cases.

Data Processing and Data Analysis: Odds ratios were used to measure the association of breast cancer risk with intake of sea food. Unconditional logistic regression from the statistical package SAS were used to get the maximum estimator of ORs and their 95% confidence intervals (CIs) and then used to the line trend test of ODDS RATIO. All the odds ratios were adjusted by age, age of menarche and menopause family history of breast cancer sea food intake.

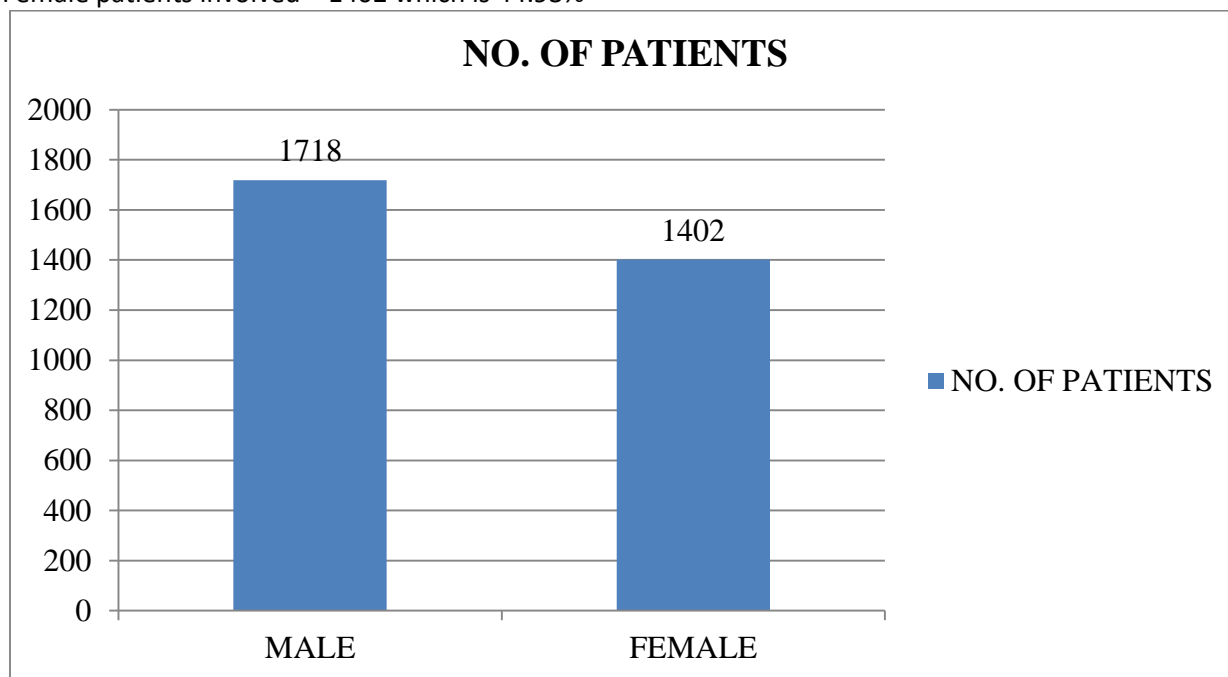
Data is processed into Master Sheet (in EXCEL Format) by Computer Compilation and data analysis is done through Scoring to the Variables in the data.

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RESULTS

Gender Wise Distribution

Male patients involved – 1718 which is 54.06%
 Female patients involved – 1402 which is 44.93%



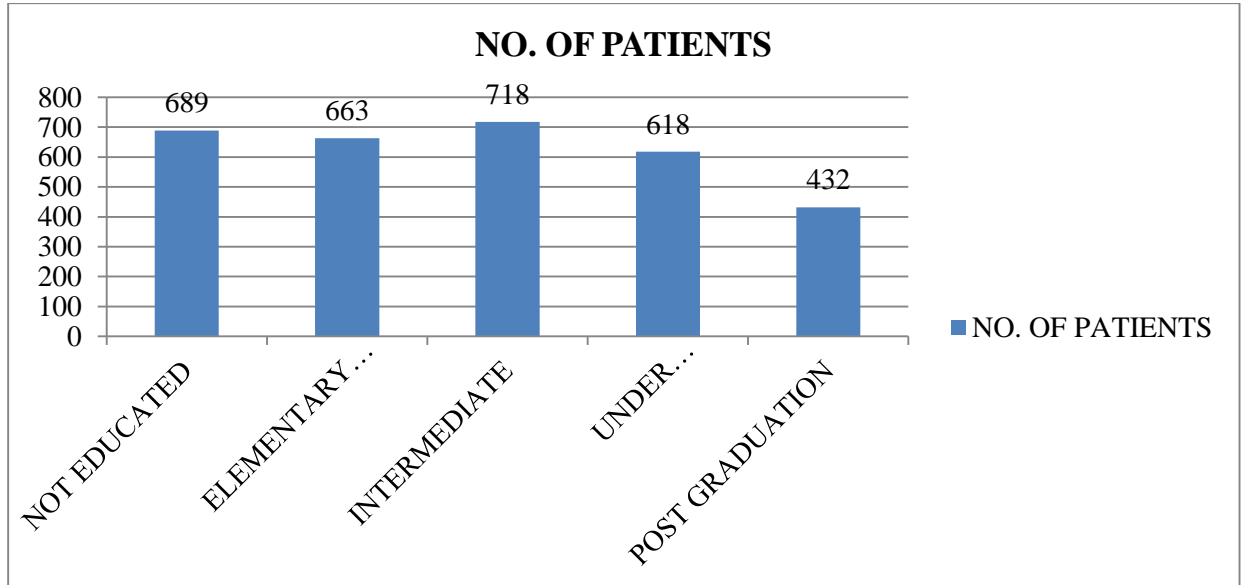
Graph 1: It represents the Number of Patients Vs Gender Wise Distribution.

Table 1: EDUCATIONAL STATUS

S.NO.	EDUCATIONAL STATUS	NO. OF PATIENTS	PERCENTAGE (%)
1	Not Educated	689	22.08



2	Elementary School	663	21.25
3	Intermediate	718	23.01
4	Under Graduation	618	19.80
5	Post-Graduation	432	13.84



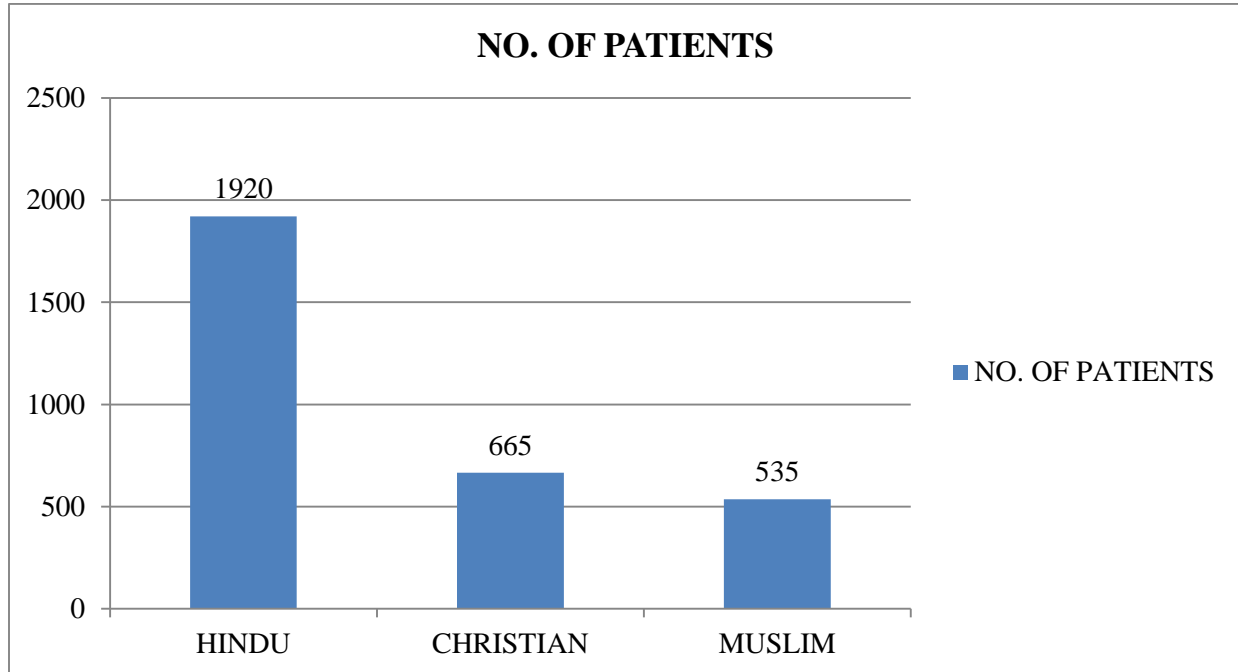
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Graph 2: It represents the Number of Patients Vs Educational Status

STATUS OF RELIGION

1. Patients from HINDU religion 1920 which is 61.53 %
2. Patients from CHRISTIAN religion 665 which is 21.31%
3. Patients from MUSLIM religion 535 which is 17.41%





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Graph 3: It represents the Number of Patients Vs Status of Religion

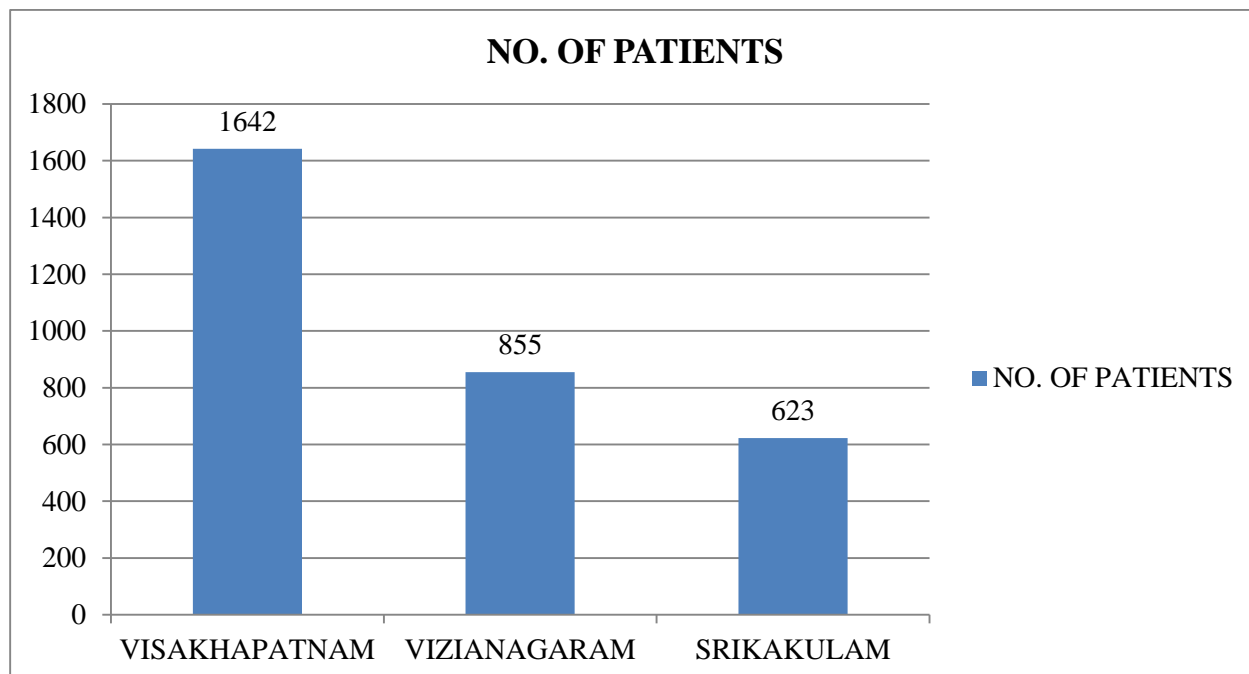
FINANCIAL STATUS

1. Below Poverty Line: No. Of Patients – 2131, Percentage – 68.30
2. Above Poverty Line: No. of Patients – 989, Percentage – 31.70

Table 2: LOCATION

S.NO.	LOCATION	NO. OF PATIENTS	PERCENTAGE (%)
1	Visakhapatnam	1642	52.62
2	Vizianagaram	855	27.40
3	Srikakulam	623	19.96





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Graph 4: Represents the Number of Patients Vs Location

COASTAL REGION

1. Patients Near to Coastal Region: 1640 (52.62%)
2. Patient Far to Coastal Region: 1480 (47.37%)

OCCUPATION

1. Patients Having Fishing as Occupation: 1151 (36.89%)
2. Patients From Other Occupations: 1969 (63.10%)

ALCOHOL CONSUMPTION

1. Alcoholics involved – 1418 (45.45%)
2. Non- Alcoholics – 1702 (54.55%)

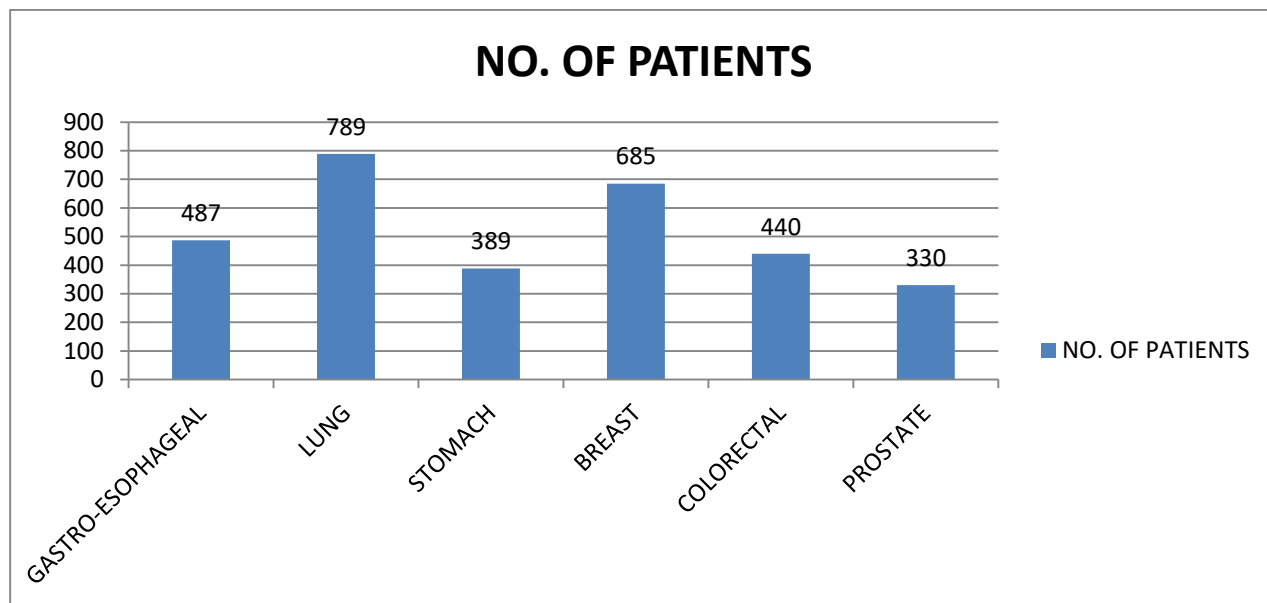
SMOKING

1. Smokers involved – 1040 Which Is 33.33%
2. Non-Smokers Involved – 2080 which Is 66.66%

Table 3: TYPE OF CANCER

S.NO.	TYPE OF CANCER	NO. OF PATIENTS	PERCENTAGE (%)
1	Gastro-Esophageal	487	15.601
2	Lung	789	25.28
3	Stomach	389	12.46
4	Breast	685	21.95
5	Colorectal	440	14.10
6	Prostate	330	10.57



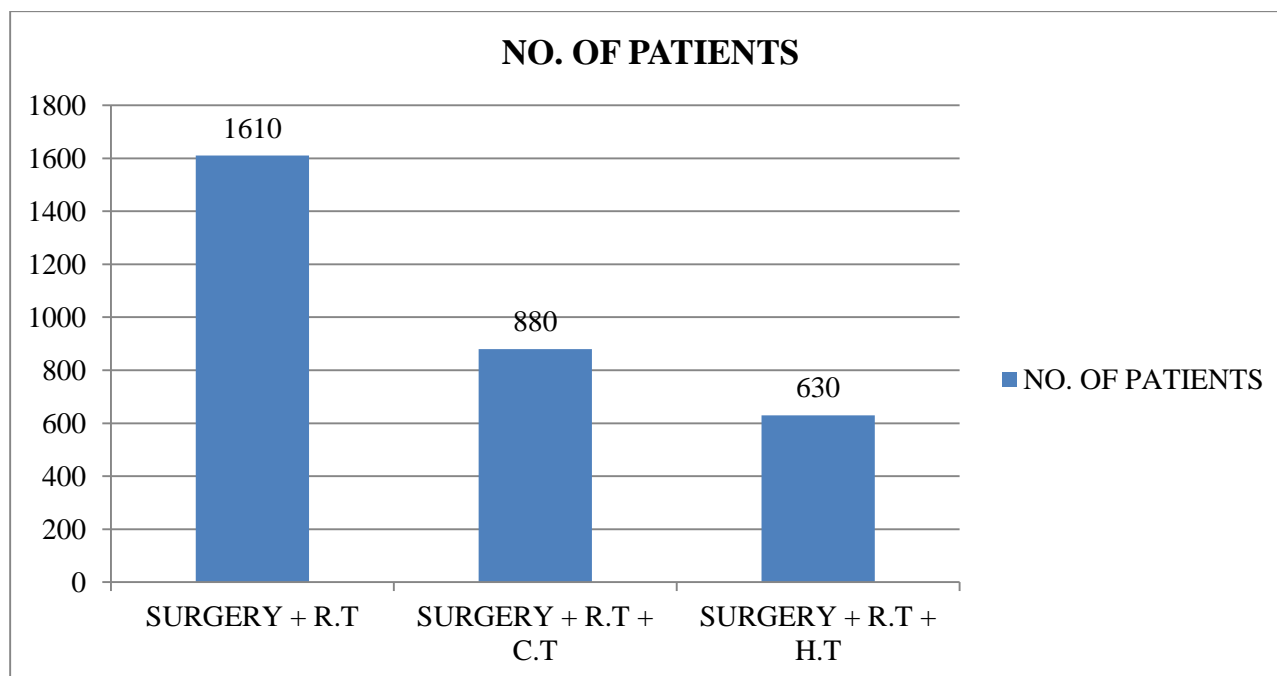


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Graph 5: It represents the Number of Patients Vs Type of Cancer

Table 4: TREATMENT PLAN

S.NO.	TREATMENT PLAN	NO. OF PATIENTS	PERCENTAGE (%)
1	Surgery + R.T	1610	51.60
2	Surgery + R.T + C.T	880	18.20
3	Surgery + R.T + H.T	630	20.10

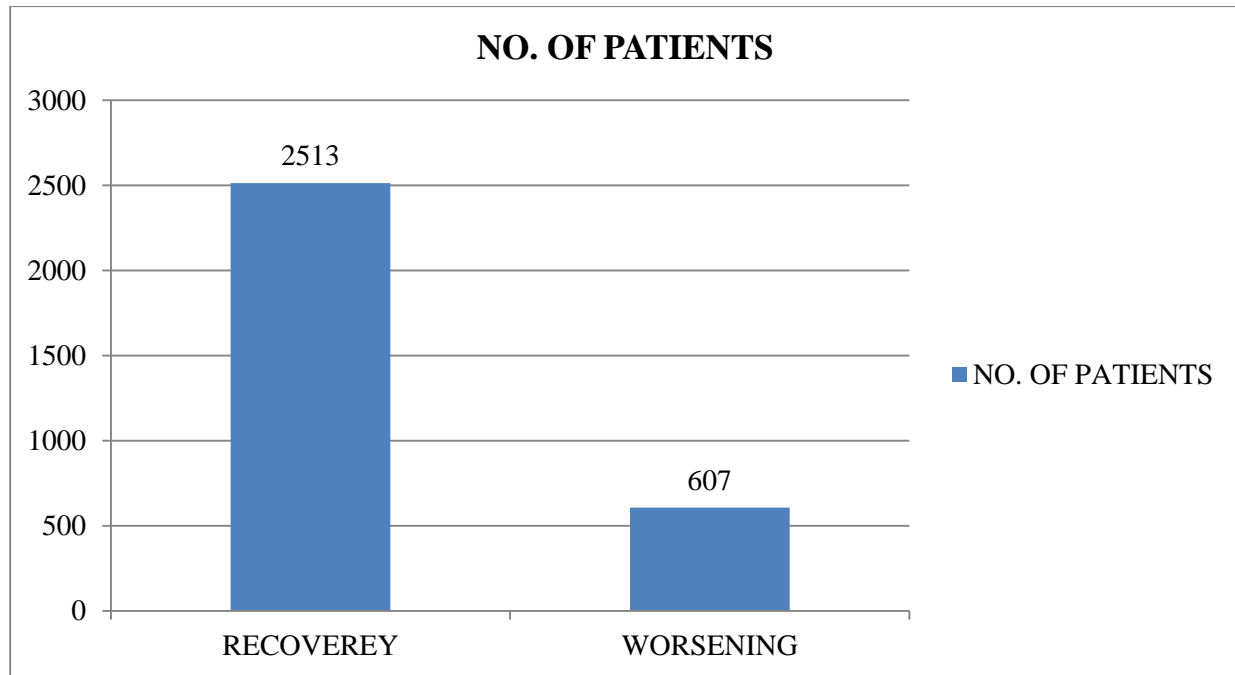


Graph 6: Represents the Number of Patients Vs Treatment Plan

Table 5: RECOVERY STATUS

S.NO.	RECOVERY STATUS	NO. OF PATIENTS	PERCENTAGE (%)
1	Recovery	2513	80.54

2	Worsening	607	19.45
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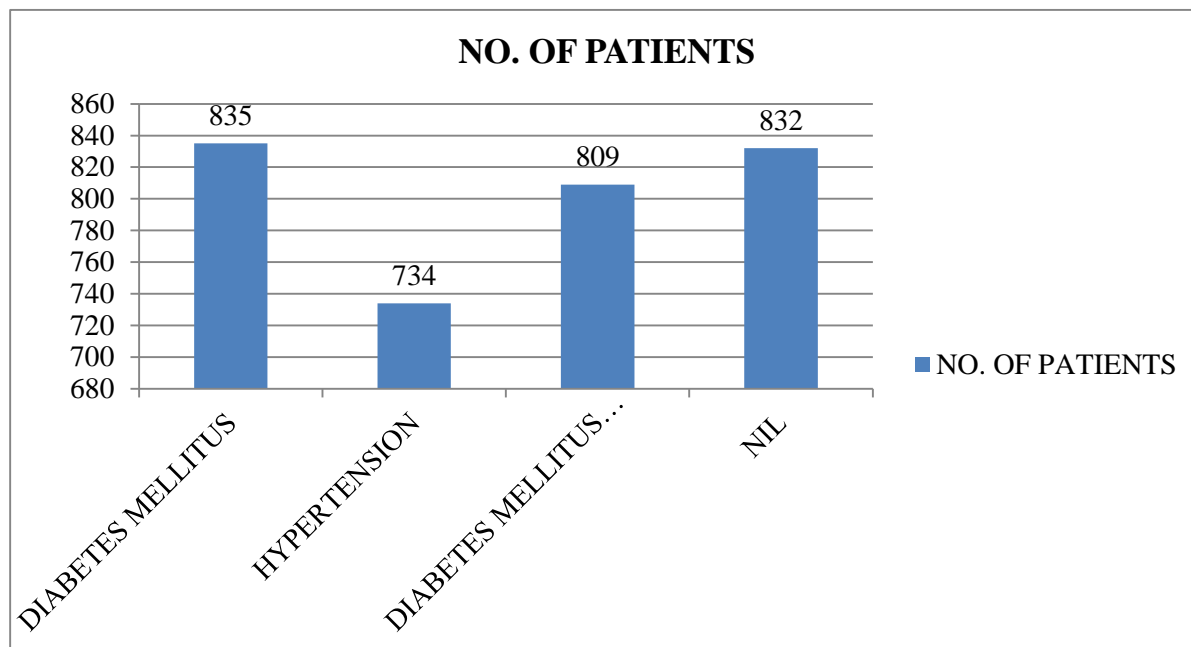
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Graph 7: It represents the Number of Patients Vs Recovery Status

Table 6: CO-MORBID CONDITIONS

S.NO.	CO-MORBID CONDITIONS	NO. OF PATIENTS	PERCENTAGE
1	Diabetes Mellitus	835	26.76
2	Hypertension	734	23.52
3	Diabetes Mellitus + Hypertension	809	25.92
4	Nil	832	26.66



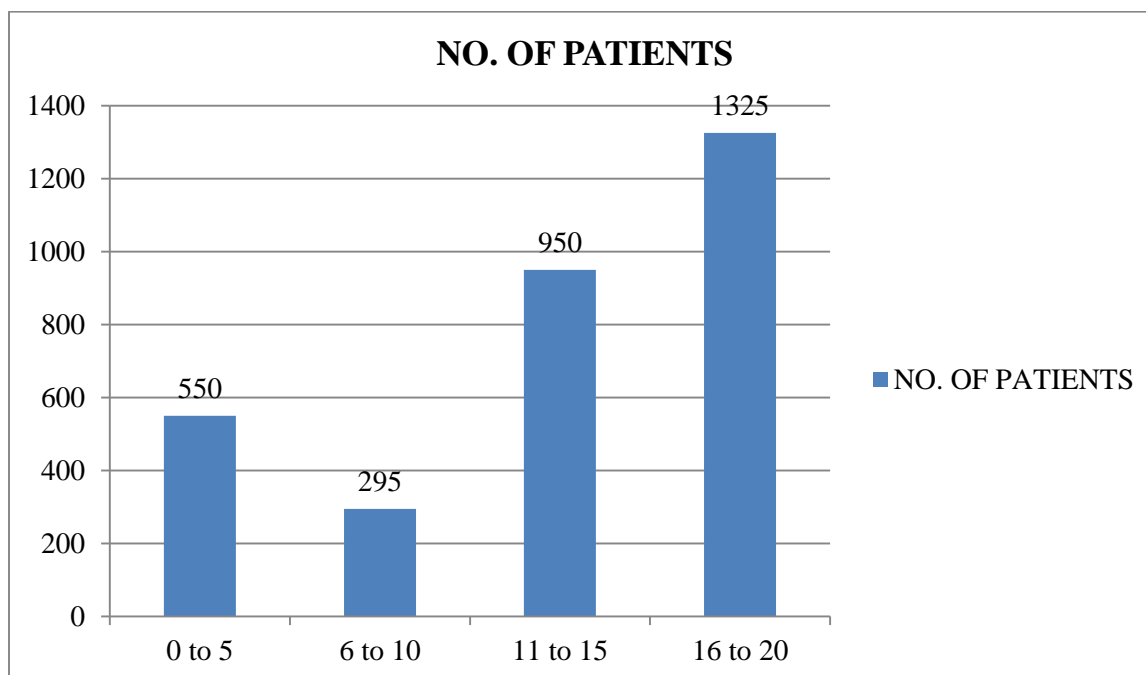


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Graph 8: It represents the Number of Patients Vs Co-Morbid Conditions

Table 7: ESTIMATED DIETARY SCORE

S.NO.	ESTIMATED DIETARY SCORE	NO. OF PATIENTS	PERCENTAGE (%)
1	0 to 5	550	17.62
2	6 to 10	295	9.45
3	11 to 15	950	30.44
4	16 to 20	1325	42.46



Graph 9: It represents the Number of Patients Vs Estimated Dietary Score



Table 8: Case controls comparison for specific demographic and others characters

S.no.	Age (menarche age)(years)	Cases (685)	Controls (682)	χ ² VALUE	P VALUE
1.	>14 <13	481(70.21) 204(29.78)	561(82.2) 121(17.74)	7.67	0.003
2.	Menopausal age (years)				
	<50 >50	226(62.7) 134(57.22)	295(75.6) 95(24.35)	30.11	0.001
3.	Paternal/maternal breast cancer history				
	NO YES	67(97.9) 14(2.04)	665(97.5) 17(2.5)	16.11	0.001
4.	Over all sea food intake (in quantity (gms))				
5.	<500gms 500-1000 1001-1500 >1500	137(20.0) 219(31.97) 115(16.78) 214(31.24)	138(20.23) 209(30.64) 119(17.44) 216(31.67)	8.11	0.002

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Table 15 shows the comparison of cases and controls about demographic factors, family history, menopausal status, menarche related factor of breast cancer. Pre menopausal women are higher in number Compared to Post-menopausal. There was a less no. of cases of

both pre – menopausal and menopausal women are shown with a family history of breast cancer. Both cases and controls were distributed in equal proportions in considerations of sea food intake via <500gm, >1500gm.

Table 9: Sea food consumption and Breast cancer risk

FISH INTAKE	CASE /CONTROL	ODDS RATIO (95%CI)
Smoked/salted fish		
Never/once	77/66	1.00
2-3 times per month	120/37	0.59(0.55-1.10)
1-2 times per week	149/178	0.69(0.66-1.20)
3-4 times per week	240/300	1.45(0.71-1.66)
5+times per week	99/101	6.01(3.10-11.68)
	P TREND <0.001	
Crab		
Never/once	261/241	1.00
2-3 times per month	199/171	0.67(0.55-0.71)
1-2 times per week	88/109	0.47(0.35-0.61)
3-4 times per week	84/101	0.31(0.21-0.58)
5+times per week	53/60	0.19(0.10-0.31)
	P TREND 0.0456	
Prawn		
Never/once	259/243	1.00
2-3 times per week	197/174	0.47(0.66-0.69)
1-2 times per week	98/99	1.12(0.91-0.99)
3-4 times per week	94/123	1.92(0.94-0.99)



5+ times per week	37/43	0.37(0.55-0.64)
	P TREND 0.231	
Post menopausal	CASE/CONTROL	ODDS RATIO
Smoked/salted fish		
Never/once	39/35	1.00
2-3 times per week	89/26	0.88(0.44-1.11)
1-2 times per week	89/118	1.67(0.82-1.40)
3-4 times per week	120/121	13.45(1.44-3.11)
5+times per week	69/81	17.11(4.76-6.62)
	<0.001	
Crab		
Never/once	161/121	1.00
2-3 times per week	99/85	4.31(3.13-4.67)
1-2 times per week	46/58	2.11(3.01-4.15)
3-4 times per week	51/71	1.14(2.89-3.61)
5+times per week	33/21	0.89(1.35-2.81)
	P TREND 0.346	
Prawn		
Never/once	139/143	1.00
2-3 times per week	101/98	5.31(4.61-5.11)
1-2 times per week	51/61	4.11(3.89-4.11)
3-4 times per week	49/64	2.10(2.89-3.19)
5+times per week	19/21	0.69(1.35-2.11)
	P TREND <0.001	
Pre menopausal	CASE/CONTROL	ODDS RATIO
Smoked/Salted fish	P T	
Never/once	21/22	1.00
2-3 times per week	44/41	0.91(0.55-1.21)
1-2 times per week	56/53	1.57(0.91-1.66)
3-4 times per week	121/120	14.41(1.89-3.43)
5+ times per week	37/35	18.21(4.61-6.63)
	P TREND 0.567	
Crab		
Never/once	131/181	1.00
2-3 times per week	66/65	14.21(4.11-5.66)
1-2 times per week	36/40	12.11(1.45-3.81)
3-4 times per week	37/27	1.65(0.81-1.43)
5+ times per week	25/13	0.91(0.66-1.31)
	P TREND 0.292	
Prawn		
Never/once	181/136	1.00
2-3 times per week	65/76	11.11(4.66-5.11)
1-2 times per week	41/35	10.21(1.66-3.91)
3-4 times per week	29/40	1.86(0.91-1.45)
5+ times per week	10/29	0.99(0.67-1.51)

P trend 0.144



Table 16 indicates the Clear statistical significance was been in case of salted fish/ smoked fish intake in both cases and controls and in both pre menopausal and menopausal women where as no statistical significance was observed in association with crab and prawns in both cases and controls and also in pre-menopausal and menopausal women.

DISCUSSION

GENDER:

Out of 3120 cases 1718 cases (55.06%) were found to be male and 1402 cases (44.93%) were found to be female, there is no slight increase in cancer incidence in males when compared with females because of life style and excessive eating habit of males when compared with females as mentioned in graph 1.

EDUCATIONAL STATUS:

As enlisted in table 1, Out of 3120 cases 689 cases (22.08%) were found to be non educated, 663 cases (21.25%) were studied up to elementary school ,718 cases (23.01%) were studied up to intermediate, 618 cases (19.80%) were studied up to graduation and 432 cases (13.84%) were found to be post graduated. There is no coincidence between cancer incidence and educational status of the patient (mentioned in graph 2).

RELIGION:

As mentioned in graph 3, Out of 3120 cases 190 cases (61.53%) were found to be from Hindu religion and 665 cases (21.31%) were belonging to Christian religion and 535 cases (17.14%) were belonged to Muslim religion. There was no correlation between religion and cancer incidence.

FINANCIAL STATUS:

Out of 3120 cases 2131 cases (68.30%) were found to be below poverty line and 989 cases (31.70%) were found to be above poverty line with a percentage of 31.90. there is no significant correlation between cancer incidence and financial status of the patient. The financial status may affect treatment procedure for cancer.

LOCATION:

Out of 3120 cases, as enlisted in table 2 1642 cases (52.62%) were belonged to Vishakhapatnam region and 855 cases (27.40%) were belonged to Vizianagaram region and 623 cases (19.96%) were belonged to Srikakulam region (as mentioned in graph 4). There is no significant correlation between cancer incidence and locality of the patient.

COASTAL REGION:

Out of 3120 cases 1640 cases (52.62%) were found to be residing near coastal region and 1480 cases (47.37%) were found to be residing far from coastal region.

OCCUPATION:

Out of 3120 cases 1151 cases (36.89%) were found to be fishing and fishing related occupation, and 1969 cases (63.10%) were found to be related to other professions (including house wives and unemployed males).

ALCOHOLISM:

Out of 3120 cases 1418 cases (45.45%) were found to be alcoholic including males and females and 1702 cases (54.55%) were found to be non alcoholics including males and females.

SMOKING:

Out of 3120 cases 1040 cases (33.33%) were found to be smokers including males and females and 2080 cases (66.66%) were found to be non smokers including males and females. Excessive smoking habit and excessive eating sea food (salt fish) may increase incidence of lung cancer.

DIAGNOSIS:

Out of 3120 cases as enlisted in table 3, 487 cases (15.66%) were diagnosed with gastro-esophageal carcinoma, 789 cases (25.28%) were diagnosed with lung carcinoma and 685 cases (21.95%) were diagnosed with breast carcinoma, 389 cases (12.46%) were diagnosed with gastric carcinoma, 440 cases (14.10%) were diagnosed with colorectal carcinoma and 330 cases (10.57%) were diagnosed with prostate cancer (as mentioned in graph 5). The more prevalence of lung cancer when compared with other carcinomas may be due to excessive intake of sea food along with smoking habit by most of the patients.

TREATMENT PLAN:

Out of 3120 cases as enlisted in table 4, 1610 cases (51.60%) were undergone surgery and radio therapy, 630 cases (20.10%) were undergone surgery and radiotherapy and hormonal therapy more number of cases had undergone surgery and radiotherapy as all the carcinomas are solid tumors for which surgery and radio therapy are primary treatment options (as represented in graph 6).

RECOVERY STATUS:

As enlisted in table 5, Out of 3120 cases 2513 cases (80.54%) were recovering with positive prognosis and 607 cases (19.45%) were shown poor prognosis (as represented in graph 7). The reason for poor prognosis is vast it may be due to non medication adherence and overall non compliance exhibited by the patients.

CO MORBIDITY:

Out of 3120 cases as enlisted in table 6, 835 cases (26.76%) were having a co morbidity of diabetes mellitus, 734 cases (23.52%) were having a co morbidity of hypertension and 809 cases (25.92%) were found to be having a co morbidity of both diabetes mellitus and hypertension. 832 cases (26.66%) were not having any co morbidity of either diabetes mellitus and hypertension (as represented in graph 8).

DIETARY SCORE:

As enlisted in table 7, Dietary score ranging from 0-20+ were given basing on the type of food that was taken by the patient from last six months. sea food which includes smoked fish, salted fish, crab, shrimp, prawns, 0 was given for never or less than once a month of eating, 2 was given for 2-3 times a month of eating, 4 was given 1-2 times per week of eating, 6 was as given for 3-4 times per week of eating, 8 was given for more than 5 times per week of eating (as represented in graph 9).

For red meat which includes mutton, pork, beef, 0 was given never or less than once per month of eating, 1 was given 2-3 times per month of eating, 2 was given 1-2 times per week of eating, 3 was given for 3-4 times of

eating 4 was given more than five times per week of eating.

For chicken 0 was given never or less than a month of eating, 1 was given for 2-3 times per month of eating, 2 was given for 1-2 times per week of eating, 3 was given for 3-4 times per week of eating, 4 was given more than five times per week of eating. After data interpretation 550 cases (17.62%) were found to be seen in between the score of 0-5, 295 cases (9.45%) were found to be seen in between the score of 6-10, 95 cases (30.44%) were seen between score of 11-15, and 1325 cases (42.46%) were found to be seen in between score of 16-20, it may be due to eating habit of patients particularly sea food (salted fish, smoked fish) as enlisted in table 8.

As enlisted in table 9, The present study has analyzed the relationship between intake of sea food (salted fish, smoked fish, crabs, prawns and breast cancer incidence. It was found that intake of salted fish/ smoked fish has positive correlation with breast cancer incidence where as no significant correlation was observed with intake of crabs, prawns with breast cancer incidence. Sea food/ salted fish contain the carcinogenic substances like N-methyl Di methyl amine and N-methyl Di ethyl amine which might be are the culprits of breast cancer incidence.

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CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest.

CONCLUSION

The present study is a two year study which includes 3120 cases of both males and females from two different hospitals [Mahatma Gandhi cancer hospital and research institute, K.G.H Vishakhapatnam]. After collecting detailed information from patients through a structural questionnaire, and interpretation of results, the

following conclusion were drawn. Almost males and females were equally shown the incidence of different types of cancer. There is no significant correlation between crabs, prawns, salted fish, intake with esophageal carcinoma and pancreatic carcinoma. After case control analysis of breast cancer cases and controls and in both pre-menopausal women and post-menopausal women salted fish/smoked fish are having positive correlation with breast cancer incidence where as no significant correlation was observed in both pre menopausal and post menopausal cases and controls with crabs and prawn intake. There is no significant correlation between cancer incidence and factors such as educational status, financial status, religion, location, occupation, and co- morbidity conditions. Most of the patients have undergone surgery and radiotherapy as primary treatment options.

In case of hormonal related carcinomas hormonal analogues were included in the treatment regimen. About 609 cases (19.45%) of patients were found to exhibit the poor prognosis. Different factors influence for this poor prognosis which include stage at which cancer was diagnosed, age factor, cancer therapy related side effects, psychological factors which lead to non- medication adherence and overall non-compliance. Counsellor the patients regarding the importance of strict medication adherence with chemotherapy as patients should attend the required chemotherapy cycles without skipping even a single cycle of chemotherapy.

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