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# Socio Economic, Lifestyle and Health Factors Influencing the Nutritional Status of Subjects with Colorectal Cancer in Calicut District of Kerala, India

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***Abstract :*** *Colon and rectal cancer is one of the common cancers among men and women from the Indian subcontinent. Faulty dietary habits and defective life style patterns resembling lack of exercise and smoking, physical status such as overweight have been proven to have serious impact in the etiology of colorectal cancer. The study comprises the documentation of the socio economic and lifestyle pattern of 100 newly diagnosed subjects with colorectal cancer. All the subjects were selected at random from Calicut District of Kerala, India. The selected patients were interviewed for collecting data using a well-structured schedule. Based on the findings of the study, it was concluded that inappropriate life style is a major etiological factor in colorectal cancer development. Underprivileged socio economic status, defective personal habits, inadequate exercise and sleeping patterns were the major physiognomies observed among the subjects, which might have contributed to the development of colorectal cancer.*

***Keywords -*** *Colorectal cancer, Socio economic factors, Personal habits, Lifestyle, Exercise*

## I. Introduction

Colorectal cancer (CRC) is one of the predominant cancers in the world in mortality, surpassed by lung cancer. It typically starts in the lining of the bowel and can grow into the muscle layers through the bowel wall. Now a day's colorectal cancer is common among people of Indian subcontinent irrespective of gender. Environmental, genetic, and dietary factors are believed to be responsible for 85 to 90 per cent of colorectal cancer cases. However the exact aetiology of colon and rectal cancer is not completely understood. Studies revealed that cancer of the colon or rectum may be more common in people who get very little exercise and who are overweight. Persons with smoking tobacco for over 20years are at risk of having colorectal cancer.

Genetic factors contributed the incidence of colorectal cancer to very less proportion of the population and the major causative factors can be attributed to changes in lifestyle with progression of age [1].Westernization of nutritional practices along with reduced physical activity can be possible causes for colorectal cancer. Number of studies provided copious epidemiological evidences on lower colorectal cancer risk with higher rates of physical activity.

Development of colorectal cancer and pattern of lifestyle is a matter of concern to researchers and clinicians in Kerala where the highest incidence of colorectal cancer was found to be among the people of Malabar region [2].Hence the current study highlights the various aspects of personal characteristics, socio economic factors and pattern of lifestyle with respect to physical exercise, smoking practices etc. and health physiognomies with respect to anthropometry and biochemical evaluations among subjects with colorectal cancer in Calicut District of Northern Kerala.

## II. Methodology

Hundred newly diagnosed colorectal cancer subjects were selected by employing purposive random sampling from hospitals of Malabar region or Calicut District of Kerala. The patients were interviewed for collecting details regarding personal characteristics, different aspects of socio economic status and lifestyle pattern using well-structured interview schedule. Life style pattern of the patients were studied with respect to their personal habits, exercise and sleeping patterns. Health factors influencing the nutritional status of the subjects with reference to the duration of the disease, diagnosis, medications, main symptoms and complications were collected from the clinical records. Nutritional status of the subjects was assessed anthropometrically and biochemically.

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Ethical guidelines for biomedical research on human subjects as per Helsinki Declaration were observed during the course of preparation of schedules and data collection. The collected data were then analyzed and evaluated.

## III. Results and Discussion

Baseline characteristics of the selected subjects indicated that majority of the subjects (65 per cent) are males. Table 1 indicates baseline characteristics of the subjects.

**Table 1 Baseline characteristics of the subjects**

| **Particulars** | **Percent of the Subjects** | | |
|---|---|---|---|
| **Age at diagnosis (Years)** | **Males** | **Females** | **Total** |
| 30 - 45 | 24 | 21 | 45 |
| 46 - 55 | 41 | 14 | 55 |
| **Total** | **65** | **35** | **100** |
| **Marital Status** | | | |
| Married | 61 | 35 | 96 |
| Unmarried | 4 | - | 4 |
| **Total** | **65** | **35** | **100** |

Table 1 showed that majority (41 per cent) of the male subjects were diagnosed with CRC at the age between 46 and 55 years and that for female subjects (21 per cent) were was at the age amid 30 and 45 years. Ninety six per cent of the respondents were married.

### 3.1. Social status of the subjects

Greater per cent of subjects with colorectal cancer belonged to Hindu (48 per cent) and Muslim (46 per cent) communities. The other 6 per cent of the patients were found to be from Christian community.

As per the Census data, the Hindus, who constitute 56.20 per cent of the total population, was the most prominent religious community in Kerala, followed by Muslims who formed 24.7 per cent of the population and Christians who constituted 19 per cent of the total population [5].

Details regarding the families of the respondents are given in table 2.

**Table 2. Details of families of the subjects**

| **Particulars** | |
|---|---|
| **Type of Family** | **Per cent of respondents** |
| Nuclear family | 71 |
| Joint family | 28 |
| Extended family | 1 |
| **Total** | **100** |
| **Family size** | |
| 1- 4 | 47 |
| 5 – 10 | 50 |
| Above 10 | 3 |
| **Total** | **100** |

It was found that majority of the subjects were from nuclear families (71 per cent).Extended families formed 1 per cent of the sample. Joint families are declining today. In India, rapid urbanization resulted in breaking up of joint families in to nuclear families [6].Family size of 5-10 was observed among 50 per cent of the respondent's families whereas 47 per cent belonged to families of size 1-4 and 3 per cent had it as above 10 members.

The data regarding the educational status of the subjects (Figure 3) revealed that, 72 subjects had school level education below tenth standard and 24 per cent of the subjects had completed S.S.L.C. Only 3 per cent of subjects were graduates.

### 3.2. Economic status of the families

Study showed that in addition to their daily salary or wages, they were getting additional income from sources like domestic animals, agriculture, rent etc (Table 8). Majority of the subjects belonged to the middle

income category. Socio economic status of the subjects revealed that 54 per cent of the subjects belonged to the income group with an earning range from Rs.5000-10000 monthly. Thirty six per cent of the subjects belonged to the income group earning below Rs.5000 per month and only 10 per cent of the subjects were earning above Rs.10000 monthly. From low income to middle income economy, there will be big increase in the burden of colorectal cancer in India [7].

**Table 3 Economic Status of the Families**

| Details of the families (%) | | | | | | |
|---|---|---|---|---|---|---|
| Monthly Family Income | Source of Income | | | | | Total |
| | Agriculture | Small scale business | Domestic animals | Rent | Others | |
| **< 5000** | 4 | - | 12 | - | 20 | 36 |
| **5000 – 10000** | 3 | 2 | 35 | - | 14 | 54 |
| **>10000** | - | - | 5 | 2 | 3 | 10 |
| **Total** | **7** | **2** | **52** | **2** | **37** | **100** |

Domestic animals were a major source of income for most of the subjects (52 per cent), followed by agriculture with 7 per cent subjects benefitting from it. Small scale business and rent were the other major sources of income for some subjects. Survey result showed that all the subjects were moderate workers. Details regarding the occupation of the subjects showed that majority (75 per cent) of the respondents were coolie workers. Rest of the subjects was engaged in occupations like farming (7 per cent) and driving vehicles (18 per cent). None of them had government jobs.

### 3.3. Life style pattern of the subjects

Various variables studied to assess lifestyle of the subjects included personal habits, exercise and sleeping patterns. Duration of sleep was found to be diverse for different subjects. Twenty seven per cent of the subjects slept for about 4-6 hours a day, while majority of the subjects (66 per cent) slept more than 6 hours a day. Only 7 per cent of the subjects slept less than 4 hours per day.

As per fig. 4, thirty eight per cent of the subjects were not having any unhealthy habits like alcohol consumption, smoking, pan chewing or taking betel leaves. Eight per cent of the subjects had the habit of both alcohol consumption and smoking. Thirty per cent of the subjects were found to be having the habit of drinking, whereas twenty per cent of the subjects had the habit of smoking. Three per cent of the subjects used betel leaves and only 1 per cent of the subject had the habit of pan chewing.

According to WHO estimates, there are about 2 billion people worldwide who consume alcoholic beverages and 76.3 million with diagnosable alcohol use disorders [8]. High alcohol consumption can lead to the development of colorectal cancer. Studies reported that cigarette smoking represents a potentially modifiable, yet arguable underappreciated risk factor for colorectal cancer [9].

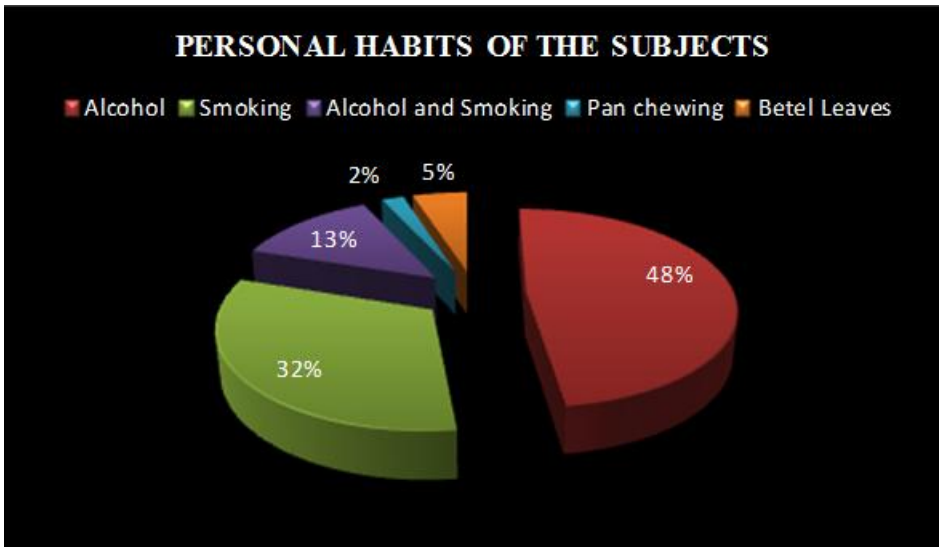


**Figure 1 Personal habit of the subjects**

Physical activity is strongly associated with a reduction in the risk of large bowel cancer. Physical fitness along with life style factors may have important roles in the prevention of cancer [10]. Details regarding the physical activity and exercise pattern of the subjects are presented in fig. 2.

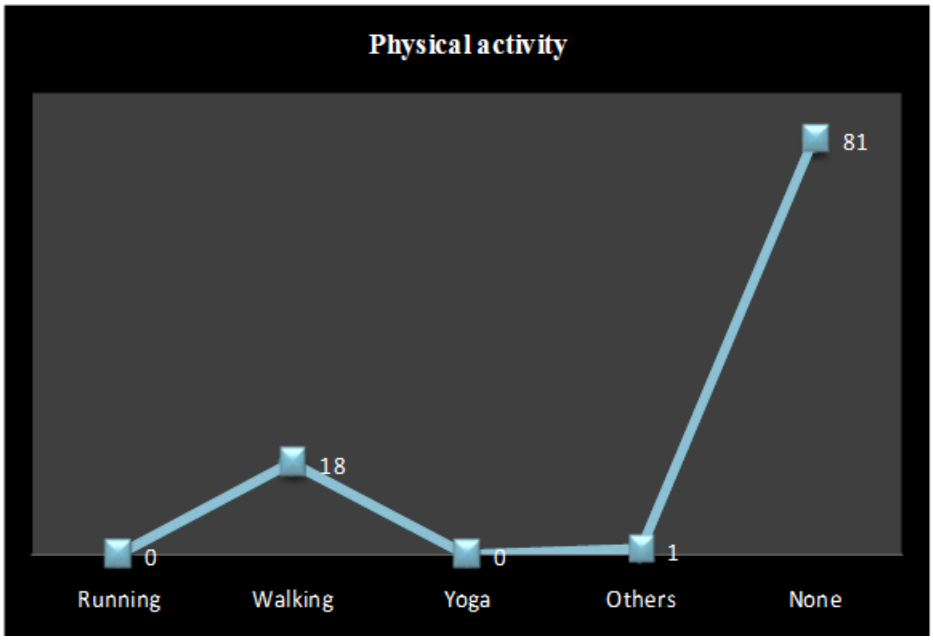


**Figure 2 Physical activities of the subjects**

Survey revealed that the physical activities like exercise were found to be very less common among the colorectal cancer patients. Only 19 per cent of the subjects engaged in some kind of exercise daily while the remaining 81 per cent had no habit of doing exercise at all. Eighteen per cent of the subjects were engaged in walking, daily for at least 1 hour, on a regular basis.

According to several scientific studies, walking is the most popular form of exercise. Evidences shows that most active men can reduce their risk of colon cancer by 19-28 per cent, and the most active women can reduce their risk by 11-32 per cent, in comparison with the least active[11,12].

### 3.4. Health Characteristics of the subjects

Health variables with respect to the duration of the disease, diagnosis, medications, main symptoms and complications were studied. Symptoms such as stomach pain, bleeding (FOB) and constipation were prevalent among the subjects who were diagnosed with colorectal cancer. Bleeding is the second most common symptom of rectal cancer [13].

Sigmoidoscopy and colonoscopy were found to be most prominent methods used for detecting colorectal cancer among the subjects. Majority of the subjects (70 per cent) had undergone sigmoidoscopy while 28 per cent of the subjects had undergone colonoscopy in the hospitals to detect colorectal cancer. Colonoscopic screening can detect advanced colonic neoplasms in asymptomatic adults [14].

From the medical records it was observed that all of the selected subjects had first stage of colorectal cancer. Seventy five per cent of the subjects started their medications instantaneously after diagnosis while twenty two per cent of the subjects started medications two months after diagnosis.

Table 4 indicate diet related non communicable diseases identified among the subjects as detailed by clinical records.

**Table 4 Details of diet related non communicable diseases identified among the subjects**

| **Diet related non communicable diseases** | **Per cent** |
|---|---|
| Diabetes Mellitus | 8 |
| Hypercholesterolemia | 1 |
| Hypertension | 4 |
| Cardiovascular problems | 3 |
| **Total** | 16 |

Table 4 showed that 16 per cent of the subjects had diet related non communicable diseases such as Diabetes Mellitus (8 per cent), Hypercholesterolemia (1per cent), Hypertension (4per cent) and cardiovascular problems (3 per cent). 84 per cent subjects were presented without any diseases except Colorectal Cancer.

### 3.4.1. Anthropometric measurements

Nutritional status of the subjects was determined by assessing the anthropometric measurements with respect to the height, weight, WHR (Waist to Hip Ratio) and Body Mass Index (BMI) of the subjects.

The mean height, weight, WHR of the male and female subjects were calculated and compared to the reference standards (Table 5). The mean heights of the male subjects were found to be higher than the standard, while the mean heights of the female subjects were found to be lesser than the standard. The mean weights of the male and female subjects were lesser than their respective ideal weights.

Waist-to-hip-ratio (WHR) is used as an indicator of abdominal obesity in population studies. It is increasingly clear that WHR is a better reflection of intra-abdominal/ visceral fat accumulation because of the postulated role of visceral fat depot in health risk disease [18]. The mean Waist to Hip Ratio (WHR) of the male and female subjects in the current study was found to be higher than the normal ratio (0.7). Males had a mean WHR 0.99, whereas females had a WHR 0.83. Several studies shows that the risk for lifestyle diseases increases with an increase in waist to hip ratio for adult male more than 0.95 and for adult female more than 0.80 .

**Table 5 Mean height, weight and Waist to Hip Ratio of the subjects**

| Gender | Per cent of subjects | Mean ± standard deviation* | | |
|---|---|---|---|---|
| | | Height | Weight | Waist to Hip Ratio |
| Male | 65 | 173.4±254.96(173) | 53.3±12.12(60) | 0.99±93.33(0.7) |
| Female | 35 | 143.2±548.13(161) | 41.2±13.17(55) | 0.83±89.94(0.7) |

*Numbers in parenthesis indicate standard values [17]

BMI of the subjects were calculated on the basis of the anthropometric measurements like height and weight. The subjects were classified on the basis of BMI as presented in Table 6.

**Table 6 Classification of subjects according to their BMI**

| Category | Classification of BMI* | Details of the subjects (%) |
|---|---|---|
| **Normal range** | 18.50-24.99 | 46 |
| **Under weight (20 - <18.50)** | | |
| i. Severe Malnutrition | 18.50 - <16.00 | 11 |
| ii. Moderate thinness | 16.00-16.99 | 18 |
| iii. Mild thinness | 17.00-18.49 | 25 |
| **Total** | - | **100** |

*Source [19]

From the findings regarding BMI given in Table 6, it was noted that half (54 per cent) of the subjects were underweight and 46 per cent of the subjects were having normal body weight. None of the subjects were overweight.

Cancer cachexia should be expected if an involuntary or unexpected weight loss of greater than 5 per cent has occurred within the previous 6-month period, especially when combined with muscle wasting [15]. A weight loss of 10 per cent or more indicates more severe depletion [16].

More recent evidence indicates that a tendency for central distribution of adiposity also called visceral adiposity increases the colorectal cancer risk independently of the BMI [20].

In a situation where BMI values of the subjects indicated the absence of obesity or overweight in contrast to the above normal WHR values, it can be stated that the patients had a chance of having abdominal obesity. Colorectal carcinogenesis is significantly related to abdominal obesity [21].

### 3.4.2. Biochemical and hematological evaluation of the subjects

Biochemical tests are precise measurement of individual nutrient concentration in body fluids. Biochemical changes can be expected to occur prior to clinical manifestation and can help to diagnose disease at the sub clinical stages [22].

Biochemical and Hematological parameters such as hemoglobin, WBC count and platelet count of 50 per cent of subjects who were selected as subsamples at random, were analyzed biochemically. The results are presented in Table 7.

The WBC count of majority of the subjects (90 per cent) fell within the normal range and the remaining 10 per cent fell below the normal range. All the subjects had normal platelet count.

The Hemoglobin level of the blood revealed that 92 per cent of the subjects were anemic and the remaining 8 per cent fell within the normal range.

Patients with tumors of right colon may first be seen with symptoms attributable to anemia, such as fatigue and palpitation. The anemia is hypochromic and microcytic, indicating iron deficiency [23].

**Table 7 Biochemical and hematological values of the subjects (n=50)**

| **Particulars** | **Normal range*** | **Percentage of the subjects** | |
|---|---|---|---|
| | | **No. of the respondents** | **Percentage** |
| **Hematology of the subjects** | | | |
| **WBC** | 4,500-11,000/µL | 5 | 10 |
| Below (4,500) | | 45 | 90 |
| Normal (4,500-11,000) | | | |
| **Total** | | **50** | **100** |
| **Platelets** | | | |
| Below (150) | 150-450 billion/L | 0 | 0 |
| Normal (150-450 billion/L) | | 50 | 100 |
| **Total** | | **50** | **100** |
| **Hemoglobin (mg/dl)** | | | |
| Below (13.5) | 13.5-17.5 | 46 | 92 |
| Normal (13.5-17.5) | grams/dL | 4 | 8 |
| **Total** | | **50** | **100** |

*Source [24]

## IV. Conclusion

The present study revealed that physical activities were found to be very less among the colorectal cancer patients. Only 18 per cent of the subjects engaged in some kind of physical activity while the remaining 81 per cent had no habit of doing exercise at all. It was also found that 58 per cent of the subjects had health problems. Most of the subjects were found to be under weight (54 per cent) at the time of the survey. Anthropometric measurements of the subjects revealed that, when classified based on BMI, half of the subjects were underweight (54 per cent) whereas 46 per cent had normal range of weight. The mean Waist to Hip Ratio was found to be high for all the subjects including males and females. This indicated that the subjects had abdominal obesity. Biochemical analysis of the blood constituents revealed that the haemoglobin levels of the subjects were below normal, which showed that they were anaemic.

Based on the findings and evidences provided by the present study, it can be concluded that rapidly changing lifestyle pattern and socioeconomic status has a greater influence on the development of colorectal cancer. Poor socio economic status, faulty personal habits, improper exercise, irregular sleeping patterns etc. were the major characteristics observed among the patients, which might be some of the causative factors that have contributed to the development of colorectal cancer among them.

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