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## Relationship between Nutritional Knowledge and Body Mass Index: A Quantitative Investigation among College Students of Kerala

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### ABSTRACT

The study aims to examine whether nutritional knowledge has a significant relationship with body mass index among undergraduate college students of Kerala. Using the Nutritional Knowledge Questionnaire, a detailed survey was conducted among 2723 students of Kerala and analysed for appropriate categorisation. The chi-Square method was used to quantitatively measure the association between nutritional knowledge and body mass index. The findings were discussed in large based on a detailed review of the literature.

**Keywords**— Nutritional Knowledge, Body Mass Index, Nutrition Transition, Nutritional Knowledge Questionnaire.

### I. INTRODUCTION

Along with growing urbanization and uni-polar habits in food consumption throughout the world, most of the global burden of diseases became associated with diet. Around two-thirds of deaths in the world are due to non-communicable diseases, and among them, obesity, overweight, and related issues contribute the largest. Globally, the deaths due to obesity reached around 8% in 2015 (in countries like Mexico, it is near to 20%) from 4.5% in 1990 (WHO, 2013). Along with this increase, obesity became a problem in rich countries and all levels of income. Obesity, overweight, weight loss and protein depletion are reflecting nutritional alterations in the body. It is important to note that obese people are ultimately subject to malnutrition, referred to as the 'double burden of malnutrition. As a result of the nutritional poverty in the body, the poor immune system makes the person a victim of several infections. Hence it becomes a significant health constraint in the present world.

Awareness of diet, nutrition and other related health aspects becomes vital in such a scenario. As all

these are highly inter-connected, exposure to one variable will open up others. Among them, nutritional knowledge refers to an individual's capacity to utilize information on nutrition and related things based on experience. It is influenced by dietary practices and is the fundamental pillar of dietary planning. On the other side, body mass index is a standard statistical tool to measure the relative weight of an individual based on weight and height and classify the person as underweight, normal, overweight or obese (Nuttall, 2015). Hence there is an association between awareness of nutritional consumption and body mass index.

#### **Background of the study:**

The nutrition transition, which is the shift from traditional dietary practices based on fibre and cereal to that based on fat and sugar (Popkin, 2001), is one of the primary reasons for increasing overweight and obesity in developing countries like India. It reached 5% in 2007 in India (IIPS-India and Macro International, 2007). Compared to rural areas, it is urban regions affected with overweight and obesity. Among states, Punjab (33.9%), Kerala (29.15%) and Goa (23.9%) are the most affected (IIPS, 2007). International literature pointed out that neither general educational standards nor public information on nutritional issues insulate society to get into the trap of overweight or obesity [The distinction between overweight and obesity is essential to note here. An individual who has at least 20% higher weight than average is considered obese (Srivastava, 2009)]. When the occurrence of overweight and obesity among people, irrespective of region, age, gender and income level, has almost doubled since the 1990s, the state administration and civil society should adopt urgent and suitable mechanisms to address this non-communicable disease.

#### **Statement of the Problem:**

As explained above, nutritional knowledge has a positive effect on health status. The growing obesity ratio throughout Kerala is pointing out to the deficiency of a

practical long term vision on public health. In this context, it is imperative to investigate the relationship between nutritional knowledge and body mass index among the educationally privileged college students of Kerala's educationally advanced region in the Indian subcontinent.

#### **Objectives:**

The present paper aims to evaluate the relationship between nutritional knowledge and body mass index among graduate college going students of Kerala without considering their gender, geographical background and financial status. The research questions of the study are the following.

1. To find out the level of nutritional knowledge of college students of Kerala.
2. To find out the categories of body mass index of college students of Kerala.
3. To find out the relationship between nutritional knowledge and body mass index.

It is hypothesized that there will be a significant association between nutrition knowledge and BMI of college students in Kerala.

#### **Literature Review:**

Understanding more about nutritional knowledge and body mass index will enhance individual's and community's awareness, which will shape ideas and approaches of society to improve general health level. There were studies on the nutritional knowledge among HIV patients (Anand & Puri, 2013), polytechnic students (Ibrahim, Ismail, & Mohammed, 2014), mothers (Saaka, 2014), and college students (Barzegari, Ebrahimi, Azizi, & Ranjbar, 2011). It was observed that nutritional knowledge among Indians is low (Anand & Puri, 2013).

The Quetelet Index, developed by Adolphe Quetelet in 1832, was renamed the body mass index in 1972 by Ancel Keys (Eknoyan, 2008). There were studies on body mass index and its relationship with dietary patterns (Hausman, Johnson, Davey, & Poon, 2011), income and region (Fernald, 2007; Singh & Mishra, 2001), physical activity (McMurray, Harrell, Deng, Bradley, Cox, & Bangdiwala, 2000), and socio-behavioural practices like marital status (Averett, Sikora, & Argys, 2008; Jeffery & Rick, 2002) and market access (Brown, Vargas, Ang, & Pebley, 2008; Inagami, Cohen, Finch, & Asch, 2006). One

can observe a turn around in body mass index status, which was inverse with socio-economic status before (Sobal & Stunkard, 1989), became slightly positive in general since the 1990s. Later it was found that the association between body mass index and per capita income is not a constant function (Monteiro, Conde, Lu, & Popkin, 2004), but still, the debate is going on (McLaren, 2007). In the Indian case, it was found that socio-economic status has a positive correlation with body mass index among women (Subramanian & Smith, 2006).

## **II. METHODOLOGY**

The study was conducted during 2014-15 on 2723 samples with age ranging from 17-27 years with an average age of 19.1 years. The random sampling method was used to collect the data from different types of colleges in Kerala, including government arts and science colleges, aided arts and science colleges, self-financing arts and science colleges, government engineering colleges, quasi-government engineering colleges, and self-financing engineering colleges. Out of the 2723 sample, 1235 were male, and 1488 were female. The variables selected for the study was Nutritional Knowledge (NK) and Body Mass Index (BMI). The tools used to collect the data was the Nutritional Knowledge Questionnaire developed by Paugh (Paugh, 2005), and the reliability of the questionnaire is 0.645. There were 29 questions with the range of scores from 29 to 116 and with the categorization of poor (below 55%), fair (55% to 69%), good (70% to 84%) and excellent (above 85%). BMI was calculated with a person's weight in kilograms divided by the square of height in meters. A high BMI can be an indicator of high body fatness. Descriptive statistics like mean and standard deviation was calculated. To test the hypothesis, Chi-Square was used, and the level of significance was set at 0.05 level.

#### **Analysis and Findings:**

The researcher calculated the number of students and their respective percentage score by using basic arithmetic tools. The following table shows the details.

**Table 1: Categorization on Nutritional Knowledge & Body Mass Index of Students of Colleges in Kerala**

| Nutritional Knowledge |      |         | Body Mass Index            |      |         |
|-----------------------|------|---------|----------------------------|------|---------|
| Category              | N    | Percent | Category                   | N    | Percent |
| Poor                  | 283  | 10.39   | Under weight (below 18.5)  | 693  | 25.00   |
| Fair                  | 1186 | 43.55   | Normal (18.5 to 24.9)      | 1804 | 66.00   |
| Good                  | 67   | 2.46    | Over weight (25.0 to 29.9) | 176  | 7.00    |
| Excellent             | 1187 | 43.59   | Obese (30.0 and above)     | 50   | 2.00    |
| Total                 | 2723 | 100.00  | Total                      | 2723 | 100.00  |

Source: calculated figures

According to the table, Kerala's college students are more or less aware of the importance of nutritional knowledge in making a healthy body. Around 90% of them have some knowledge of nutrition, whereas every four out of ten students have excellent nutrition exposure. An almost equal number of students has a fair idea about the same. This level of exposure is well reflected in the body mass index too. Out of the total, two-thirds of pupils have an average BMI level whereas those with overweight and obesity are less than ten per cent. But it is alarming to note that a quarter of them are showing underweight.

**Table 2: Descriptive Statistic of Nutritional Knowledge Score and Body Mass Index of Samples in Colleges of Kerala**

| Parameter              | N    | Mean  | S.D.   |
|------------------------|------|-------|--------|
| N K Score (out of 116) | 2723 | 78.83 | 12.473 |
| BMI                    | 2723 | 20.1  | 3.419  |

Source: calculated figures

The mean and standard deviation of nutritional knowledge of 2723 students is 78.83, and 12.473 and body mass index are 20.1 and 3.419, respectively. To analyse the hypothesis Chi-square test was used, and the table is given below

**Table 3: Chi-Square Tests of Nutritional Knowledge and Body Mass Index of Kerala College Students**

|                              | Value               | Df | Asymp. Sig. (2-sided) |
|------------------------------|---------------------|----|-----------------------|
| Pearson Chi-Square           | 11.921 <sup>a</sup> | 6  | .064                  |
| Likelihood Ratio             | 10.915              | 6  | .091                  |
| Linear-by-Linear Association | 3.694               | 1  | .055                  |
| N of Valid Cases             | 2723                |    |                       |

Source: calculated figures

Table indicated the chi-square test of nutritional knowledge and body mass index of Kerala college students for verifying the independence of the two variables. Since the P-value indicated in the third column is higher than 0.05, it is concluded that the variables were independent for all three tests. The p-value was higher than 0.05, which means that there exists no relationship between the testing variables.

**Table 4: Cross Tabulation of Nutritional Knowledge and Body Mass Index of Kerala College Students**

|                                                   |                    |                | BMI (Binned) |        |       |        | Total  |
|---------------------------------------------------|--------------------|----------------|--------------|--------|-------|--------|--------|
|                                                   |                    |                | Under Weight | Normal | High  | Obese  |        |
| Nutritional Knowledge Score (out of 116) (Binned) | Poor               | Count          | 62           | 184    | 29    | 8      | 283    |
|                                                   |                    | Expected Count | 72.0         | 187.5  | 18.3  | 5.2    | 283.0  |
|                                                   |                    | Residual       | -10.0        | -3.5   | 10.7  | 2.8    |        |
|                                                   | Fair               | Count          | 312          | 776    | 78    | 20     | 1186   |
|                                                   |                    | Expected Count | 301.8        | 785.7  | 76.7  | 21.8   | 1186.0 |
|                                                   |                    | Residual       | 10.2         | -9.7   | 1.3   | -1.8   |        |
|                                                   | Good and Excellent | Count          | 319          | 844    | 69    | 22     | 1254   |
|                                                   |                    | Expected Count | 319.1        | 830.8  | 81.1  | 23.0   | 1254.0 |
|                                                   |                    | Residual       | -.1          | 13.2   | -12.1 | -1.0   |        |
| Total                                             | Count              | 693            | 1804         | 176    | 50    | 2723   |        |
|                                                   | Expected Count     | 693.0          | 1804.0       | 176.0  | 50.0  | 2723.0 |        |

Source: calculated figures

From the table, it is also clear that there is no significant relationship between nutritional knowledge and

the body mass index of Kerala's college students. The table also indicated that students with good or fair nutritional knowledge have an average body mass index, which is the desired range of body mass index.

### III. DISCUSSION OF HYPOTHESIS

The findings show that the nutritional knowledge among college-going undergraduate students is promising. Educational advancement of the state may expose the college students to better awareness of nutritional knowledge in general. Similar significant exposure to nutritional knowledge among the educated community is identified by Obayashi and others (Obayashi, Bianchi, & Song, 2003), and Parmenter and others (Parmenter, Waller, & Wardle, 2000). Reading ability will enable people to understand nutrition-related information easily. The popularity of lifestyle magazines, both in English and in the local language Malayalam, including those related to health, may positively contribute to nutritional knowledge. The awareness and vigilance among younger generations on nutritional knowledge were observed early (Parmenter, Waller, & Wardle, 2000). The present study contradicts the findings where college students are not thorough about nutritional requirements (Beydoun & Wang, 2008; Sakamaki, Toyama, Amamoto, & Liu, 2005; Kotugna, Vickery, & Mcbee, 2005; O'Dea & Abraham, 2002).

But the absence of a matching proportion of students' body mass index may be due to society's general lifestyle. A similar mismatch was noted by Parmenter and Wardle (Parmenter & Wardle, 1999). In the case of Kerala, the state has a high concentration of middle-income families. Compared to poor-income people, those from the middle class mainly join mainstream colleges than enter the parallel higher education institutions. The comparatively leisure-based lifestyle of these people results in overweight and obesity among a section of students. An increasing number of fast-food shops, increased consumption of carbonated water, and falling energy expenditure levels may lead to an increasing body mass index among them. Market access is observed as a reason for increasing obesity in several studies (Brown, Vargas, Ang, & Pebley, 2008; Inagami, Cohen, Finch, & Asch, 2006). The region's culture encourages eating and offering food as a divine custom that influences people's food intake. Similarly, as teenage creates many stresses, at least for some people, food becomes a refuge.

But the age of college-going students is ensuring the average body mass index among the majority of them. In the teenage, both male and female will be more conscious about health. Tendency to do physical exercise and participation in sports, dance and other similar activities will be high in that period. Similar trends of average body mass index are observed by Li (Li, 2013).

The hypothesis stated that there would be a significant relationship between nutritional knowledge and body mass index of under-graduate college-going students of Kerala is rejected. The insignificant relationship between nutritional knowledge and body mass index points out that variables like ethnicity, language, religion, and caste have hardly any role in influencing either nutritional

knowledge and body mass index, and they are independent of each other.

### IV. CONCLUSION

Nutritional knowledge facilitates one to make an appropriate food choice based on his health condition and circumstances. Even if his body mass index is not average due to his lifestyle or social conditions, the awareness of nutritional requirements will help him correct the mismatch at the earliest. The paper exposes the urgent need for large-scale investigation to explore the barriers in making awareness about different nutrition and body mass index concerns among the younger generations. In a consumer state like Kerala, there is a broader possibility for nutrition depletion and related health problems without sufficient public awareness efforts.

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