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A Study on Comparison of Anthropometrics of Food Handlers from Different Food Service Establishments in Cochin, Kerala, India

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Abstract

Background: Food handlers are involved in manufacturing, producing, collecting, extracting, processing, transporting, delivering, thawing or preserving food.

Aim: To compare the anthropometric parameters of different categories food handlers with respect to type of food service establishments

Methods: Anthropometric methods were used in the study with two basic variables (height and weight) and single variables such as (Body Mass Index / BMI) were utilized. All the anthropometrics were taken following standard techniques.

Results: The worst value of BMI is seen in the workers of food processing units, hospital kitchens, railway canteens and bakery. In addition, food processing unit workers have the worst BMI score. Thus from the above table, it could be observed that obesity is seen in the workers of food processing units, hospital kitchens, railway canteens and bakery; also the BMI is normal among workers of star hotels, A/C hotels, non A/C hotels and street vendors.

Conclusion: The present study shows deviation in the anthropometric measurement in food handlers from various food service establishments.

Keywords: Food handler, height, weight, body mass index, waste hip ratio, food service establishments.

Introduction

A food handler is anyone who works in a food business and who handles either food or surfaces that are likely to be in contact with food such as cutlery, plates and bowls. A food handler may do many different things for a food business. Examples include making, cooking, preparing, serving, packing, displaying and storing food. Food handlers can also be involved in manufacturing; producing, collecting, extracting, processing, transporting, delivering, thawing or preserving food (www.foodstandards.gov.au).

Quality of work depends on the health status of workers. The productivity of the food establishments depends on the health condition of workers .Nutritional status is generally assessed using the body mass index (BMI). Cut-off points of BMI in adults to define grades of thinness were also validated by measurements of basal metabolic rate (Cole *et al*., 1992). BMI and mortality association determines overweight classification among people (James *et al*., 1998; WHO, 1995). Anthropometry is a dependable method used to measure the body size and proportion such as length, width, circumference and thickness of skinfold. It's an all encompassing, practical, low cost diagnostic tool that assess the health and nutritional status of subjects alerting any risk and survival factors (Rolland *et al*., 1995).

Anthropometric measurements are well established and widely used as indicator of nutritional and health status of children and adults (WHO, 1995). In spite of the fact that high weight and obesity are among the biggest health problems faced by today's globalizing world, low weight and hence chronic energy deficiency are the top issues that need tackling seriously on the part of developing countries (Kiple *et al.*, 2007). When assessed in terms of low weight adults, it is known that labour force based on physical power is greatly affected by this factor for economic reasons, and that, from the respect of public health, low state in environmental conditions is moved to the adult dimensions depending especially on the childhood period. Low weight is as well associated with adult mortality as with labour capacity. In field studies made in this context, the World Health Organization frequently resorts both to upper arm anthropometry and to BMI. It is seen that high weight and obesity rates are rapidly increasing across the world with a different prevalence, especially in Europe today. Obesity in the USA appears to be 28% in males and 34% in females. In some parts of Europe, it is reported that high rates of weight and obesity

rates have reached 67% in overall averages even surpassing the values of the USA (WHO, 2000).

Nutritional status is one of the most important indicators that help to elaborate public health, as well as socio-economic status. Body mass index (BMI) is one of them. Body mass index (BMI) expressed, as ratio of weight to height squared can be a good parameter to grade chronic energy deficiency (CED) in adults (Naidu and Rao, 1994).

The principle aim of the study is to compare anthropometric measurements and BMI of food handlers from eight different food service establishments such as star hotels, A/C hotels, non-A/C hotels, bakery, food processing units, railway canteens, hospital kitchens, street vendors. The variables considered include height, weight, and body mass index.

Materials and Methods

The survey to compare anthropometric parameters of food handlers from various food service establishments of Cochin corporation, Kerala, India was conducted among a group of (N=248) 248 food handlers from eight different food service establishments such as star hotels, a/c hotels, non a/c hotels, bakeries, hospital kitchen, railway canteens, food processing units, and street vendors.

Conduct of survey (N=248)

Samples for the study were selected by simple random method from Cochin Corporation. The researcher met food handlers from various food service institutes, informed them about the objectives of the present study, and asked their willingness to participate in the study and get their consents for participating in the study. Total 248 participants were selected from various food handling establishments and from this according to the study, objectives a sub sample of 31 participants were selected.

Simple random sample is a statistical method where in the participants are selected randomly from a pool of sample such that the probability of each participant being selected for the study is equal. This method of sampling is unbiased and accounts for the greater validity of the study (Yates *et al*., 2008). Hence, simple random sample statistical method was used.

Anthropometry is the single most universally applicable, in expensive and non- invasive method available to assess the size, proportion and composition of the human body (WHO, 1995). In order to categorize the sample in the various groups of normally nourished, over nourished and under nourished based on height weight and BMI of the food handlers were measured and collected data entered in spss software for tabulation.

Height / Length

Height should be measured against a flat surface and the subject must stand as upright, possible without raising their heels from the ground. Height can be measured using a non- stretchable tape. This method provides the most accurate measure. A scale was placed gently over the subjects head, so that it touched the head without pressing and reading was recorded to the nearest 0.1 cm. Plate - indicate the measure of height among subjects.

Body Weight

Body weight is the most widely used and the simplest reproducible anthropometric measurements for the evaluation of nutritional status. Weight is measured in kilograms using a weighing machine, without shoes and with light clothing.

Body Mass Index

Body mass index is calculated from height and weight and is an effective indicator of assessing the nutritional status. It is calculated from a person's weight in kilogram divided by the squared value of their height in meter square. The normal range is 25.

Body Mass Index (BMI) = Weight in Kilograms/ Height in Meter2

Results

The BMI data from selected food handlers collected in the year 2014 -2015 were analyzed. The statistical tools used for testing were standard deviation, ANOVA and post Hoc Analysis. The results of the present study conducted on food handlers from various food service establishments are discussed below:

Table- I :**BMI of Food Handlers**

ANOVA					
BMI					
	Sum of Squares	**Degrees of Freedom**	**Mean Square**	**F**	**p-value**
Between Groups	**2876.139**	**7**	**410.877**	**34.651**	**0.000**
Within Groups	**2833.948**	**239**	**11.858**		
Total	**5710.087**	**246**			

Table-I depicts the BMI food handlers from eight different food service establishments. ANOVA test was done which showed that there was statistical significance in the BMI values of workers from eight different food service establishments since p - value is less than 0.05, the mean BMI value of workers of star hotels, a/c hotels, non-a/c hotels, hospital kitchens, food processing units, railway canteens, bakery and street vendors are different.

Table-II : Body Mass Index of Food Handlers

Food Service Establishments	N	Mean	Std. Deviation
Star Hotels	**31**	**21.930**	**2.1212**
A/C Hotels	**31**	**23.223**	**3.0102**
Non A/C Hotels	**31**	**20.739**	**2.9075**
Hospital Kitchens	**31**	**26.984**	**4.3882**
Food Processing Unit	**31**	**29.361**	**3.4348**
Railway Canteens	**31**	**28.000**	**2.2616**
Bakery	**31**	**27.868**	**2.7671**
Street Vendors	**31**	**20.261**	**5.3642**

Table-II shows that the mean of BMI among workers of star hotels was around 22 with a standard deviation of 2.121. The mean of BMI among workers of A/C hotels was around 23 with a standard deviation of 3.010. The mean of BMI among workers of non-A/C hotels was around 21 with a standard deviation of 2.907.

The mean of BMI among workers of hospital kitchens is around 27 with a standard deviation of 4.388. The mean of BMI among workers of food processing unit is around 29 with a standard deviation of 3.435. The mean of BMI among workers of railway canteens was around 28 with a standard deviation of 2.261. The mean of BMI among workers of bakery was around 28 with a

standard deviation of 2.767. The mean of level of BMI among workers of street vendors was around 20 with a standard deviation of 5.364. As the value between 18.5 to 24.5 represents best level of BMI.

Table-III: Post Hoc Analysis

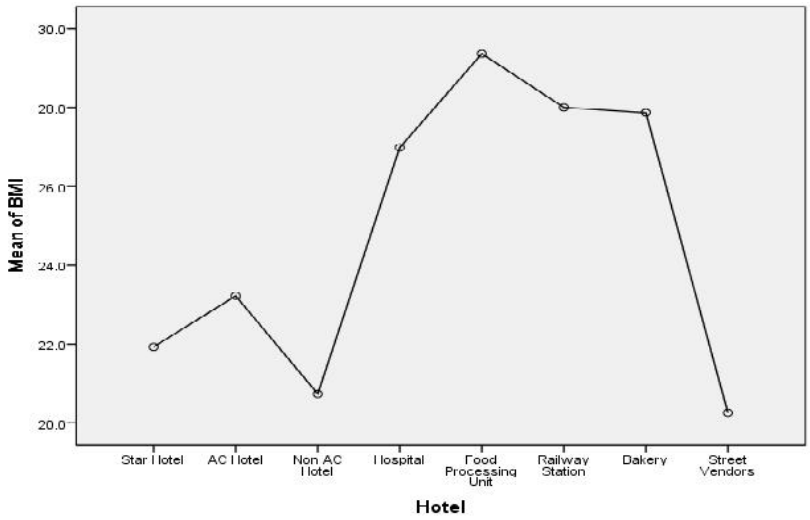
(I) Food-service establishments	(J) Food-service establishments	Mean Difference (I-J)	p-value
Star Hotels	A/C Hotels	-1.2926	0.764
	Non A/C Hotels	1.1913	0.840
	Hospital Kitchens	-5.0539	0.000
	Food Processing Unit	-7.4313	0.000
	Railway Canteens	-6.0700	0.000
	Bakery	-5.9377	0.000
	Street Vendors	1.6687	0.941
A/C Hotels	Star Hotels	1.2926	0.764
	Non A/C Hotels	2.4839	0.043
	Hospital Kitchens	-3.7613	0.007
	Food Processing Unit	-6.1387	0.000
	Railway Canteens	-4.7774	0.000
	Bakery	-4.6452	0.000
	Street Vendors	2.9613	0.230
Non A/C Hotels	Star Hotels	-1.1913	0.840
	A/C Hotels	-2.4839	0.043
	Hospital Kitchens	-6.2452	0.000
	Food Processing Unit	-8.6226	0.000
	Railway Canteens	-7.2613	0.000
	Bakery	-7.1290	0.000
	Street Vendors	0.4774	1.000
Hospital Kitchens	Star Hotels	5.0539	0.000
	A/C Hotels	3.7613	0.007
	Non A/C Hotels	6.2452	0.000
	Food Processing Unit	-2.3774	0.417
	Railway Canteens	-1.0161	0.999
	Bakery	-0.8839	1.000
	Street Vendors	6.7226	0.000

Food Processing Unit	**Star Hotels**	**7.4313**	**0.000**
	AC Hotels	**6.1387**	**0.000**
	Non A/C Hotels	**8.6226**	**0.000**
	Hospital Kitchens	**2.3774**	**0.417**
	Railway Canteens	**1.3613**	**0.832**
	Bakery	**1.4935**	**0.806**
	Street Vendors	**9.1000**	**0.000**
Railway Canteens	**Star Hotels**	**6.0700**	**0.000**
	AC Hotels	**4.7774**	**0.000**
	Non AC Hotels	**7.2613**	**0.000**
	Hospital Kitchens	**1.0161**	**0.999**
	Food Processing Unit	**-1.3613**	**0.832**
	Bakery	**0.1323**	**1.000**
	Street Vendors	**7.7387**	**0.000**
Bakery	**Star Hotels**	**5.9377**	**0.000**
	A/C Hotels	**4.6452**	**0.000**
	Non A/C Hotels	**7.1290**	**0.000**
	Hospital Kitchens	**0.8839**	**1.000**
	Food Processing Unit	**-1.4935**	**0.806**
	Railway Canteens	**-.1323**	**1.000**
	Street Vendors	**7.6065**	**0.000**
Street Vendors	**Star Hotels**	**-1.6687**	**0.941**
	AC Hotels	**-2.9613**	**0.230**
	Non A/C Hotels	**-.4774**	**1.000**
	Hospital Kitchens	**-6.7226**	**0.000**
	Food Processing Unit	**-9.1000**	**0.000**
	Railway Canteens	**-7.7387**	**0.000**
	Bakery	**-7.6065**	**0.000**

It has to be noted that if the p-value is less than or equal to 0.05, there is significant difference among the categories regarding the study variable and if the p-value is greater than 0.05 then there is no significant difference among the categories regarding the study variable. From the post hoc analysis, the BMI values of workers of star hotels have no significant difference when compared to the BMI value of workers of A/C hotels, non-A/C hotels and street vendors.

Nevertheless, it can be seen that there is significant difference in the BMI value of workers of star hotels when compared to the workers of hospital kitchens, food processing units, railway canteens and bakery. The BMI values of workers of A/C hotels have no significant difference when compared to the BMI value of workers of star hotels and street vendors. However, it can be seen that there is significant difference in the BMI value of workers of A/C hotels when compared to the workers of Non A/C hotels, hospital kitchens, food processing units, railway canteens and bakery. The BMI values of workers of non-A/C hotels have no significant difference when compared to the workers of star hotels and street vendors. The BMI values of workers of non-A/C hotels have significant difference when compared to the workers of A/C hotels, hospital kitchens, food processing units, railway canteens and bakery. The BMI values of workers of hospital kitchens have no significant difference when compared to the BMI value of workers of food processing units, canteens in the railway station and bakery. Nevertheless, it can be seen that there is significant difference in the BMI value of workers of hospital kitchens when compared to the workers of star hotels, A/C hotels, Non A/C hotels and street vendors. BMI value of workers of street vendors, star hotels, A/C hotels and non-A/C hotels are normal and have no significant difference among them. The BMI value of workers of food processing units, hospital kitchens, railway canteens and bakery are significantly higher and are obese.

Figure-1: Body Mass Index of Food Handlers



H_0: Mean of BMI = 8 V/s H1: Mean of BMI ≠ 8

The above means plot gives a pictorial representation of mean value of BMI among the workers of eight different categories of food service establishments. Clearly, the mean difference in the BMI value can also be observed. Thus, there was observed a difference in the value of BMI among the workers of different categories of food service establishments. However, this needed to test for the presence of significant difference.

Discussion

Food handler's anthropometric measurements level from various food service establishments clearly shows differences between eight categories of food service establishments. The BMI of That is the BMI value of workers of star hotels, a/c hotels, non-a/c hotels, hospital kitchens, food processing units, railway canteens, bakery and street vendors are different. Moreover, it can be seen that the star hotel, A/C hotel, non-A/C hotel workers and street vendors have best value of BMI; the workers of hospital kitchens, food processing units, railway canteens and bakery have very high BMI. Street vendors have lowest BMI value and workers of food processing unit have highest BMI value.

Thus, it could be concluded that there is significant difference in the BMI value among the eight categories of food service establishments. That is, the BMI value of workers of star hotels, a/c hotels, non-a/c hotels, hospital kitchens, food processing units, railway canteens, bakery and street vendors are different. Moreover, it can be seen that the star hotel, A/C hotel, non-A/C hotel workers and street vendors have best value of BMI; the workers of hospital kitchens, food processing units, railway canteens and bakery have very high BMI. Street vendors have lowest BMI value and workers of food processing unit have highest BMI value.

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