ORIGINAL ARTICLE

Comparative evaluation of nutritional status of elderly dentulous and completely edentulous patients wearing complete dentures

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Abstract

Introduction: The scientific progress has reached a level where nutritional interventions may play a part in the prevention of degenerative conditions of age, improvement of quality of life and impact on health care burden and resources. Moreover a timely intervention can stop weight loss in elderly at risk of malnutrition or undernourished. Evaluation of nutritional status is important for any nutrition or dietary modification. We therefore did a comparative study of evaluation of nutritional status of elderly dentulous and completely edentulous patients wearing complete dentures. **Rationale:** To evaluate nutritional status in dentulous and edentulous denture wearing elderly patient. To evaluate any relationship between edentulous denture wearer patient and malnutrition. To determine if the recommended dietary allowance is met by elderly dentulous and completely edentulous patients wearing complete dentures. To find out the need of nutritional supplement for edentulous complete denture wearer patients. **Objectives:** The objectives were to evaluate nutritional status in dentulous and edentulous denture wearing elderly patients and to find out any relationship between edentulous denture wearer patients and malnutrition. We also tried to find out the need of nutritional supplement for edentulous denture wearer patients. **Material & Method:** A total of 100 healthy Male and Female patients between the age of 60 to 80 years attending the OPD of Department of Prosthodontics, Faculty of Dental Sciences, Dharmsinh Desai University, Nadiad, Gujarat were selected and divided into two sample groups dentulous and edentulous. Subjects with no natural teeth who reported wearing complete maxillary and mandibular dentures for at least 6 months were taken as the edentulous sample and subjects with at least 24 teeth who did not wear dentures were taken as dentulous sample. Mini Nutrition Assesment Tool, 24 Hour Diet Recall & Food Frequency Form were used to evaluate the nutritional status of the subjects. The data on food consumption was converted to the calorie content of the diet and the percentage of recommended dietary allowance (RDA) was calculated for the subject according to the age, gender and activity level. Statistical analysis was done using the Chi square P value test. No investigation or intervention was conducted on patients, humans or other animals hence, ethical consideration was not applicable in this study. Null hypothesis: “There is no difference in the nutritional intake of the dentulous patients and edentulous patients wearing complete dentures”. **Result**: It was observed in this study that only 62% of the edentulous subjects were taking fruits frequently against 88% of dentulous subjects. In the same way, while 54% of dentulous subjects were consuming nuts and oil seeds, only 36% of edentulous subjects consumed them & the result is statistically significant. There was a direct relationship between edentulousness and malnutrition. 94% of the dentulous subjects in our study were well nourished according to MNA having score from 24 to 30 against 62% of edentulous subjects. The risk of malnutrition was eight times higher in edentulous as compared to dentulous subjects, 34% & 4% respectively which is highly significant statistically. Only negligible

portion was malnourished that was 2% for dentulous and 4% for edentulous subjects. Further, there was a positive correlation between the MNA score and calorie intake per day in percentage of RDA. All the subjects detected to be malnourished were taking less than 75% of RDA calorie intake. Amongst 17 edentulous subjects (34%) at risk of malnutrition, more than half (n=10) were consuming less than 75% of RDA. Even though statistically insignificant, maximum subjects in both the categories belonged to >25kg/m2 (over weight) that is total 60% of dentulous and 44% of edentulous subjects. On further division, 38% of dentulous and 28% of edentulous subjects were preobese while those belonging to obese category were 22% and 16% respectively. **Conclusion**: Undernutrition as well as obesity were common health hazards in our geriatric population. Early management by nutritional intervention, combined with oral health care, is of great importance for the improvement of nutritional parameters and the prognosis of prosthetic treatment.

Key Words

Dentulous; Edentulous; elderly; Nutritional Status; Mini Nutrition Assessment Tool

Introduction

India has acquired the label of aging nation with 7.7% of its population being more than 60 years old. There has been a sharp increase in the proportion of elderly population in India as a result of demographic transition[1]. The proportion of elderly persons in the population of India rose from 5.63 per cent in 1961 to 6.58 per cent in 1991[2] and to 7.5 per cent in 2001and it has been estimated that they would become 12% of total population by 2030[3].This is attributed to decrease in mortality arising from longer lifespan of individuals and improvements in public health and medical services leading to control of infectious diseases.

Nutrition is increasingly being recognized as an important determinant, which modulate the biological process of ageing. Nutrition is also an important factor which affects the progressive changes in the body composition associated with ageing, such as loss of bone and lean body mass3.

Inadequate nutrition rank as one of the major problem of old age. Various factors which may be responsible for the change in one's diet in old age include social isolation, living alone, limited income, lack of mobility, dental problem, diminished taste acuity, food faddism and presence of chronic diseases.

The scientific progress has reached a level where nutritional interventions may play a part in the prevention of degenerative conditions of age, improvement of quality of life and impact on health care burden and resources. Moreover a timely intervention can stop weight loss in elderly at risk of malnutrition or undernourished[4]. Evaluation of nutritional status is important for any nutrition or dietary modification. We therefore did a comparative study of evaluation of nutritional status of elderly dentulous and completely edentulous patients wearing complete denture.

Aims & Objectives

1. To evaluate nutritional status in dentulous and edentulous denture wearing elderly patient.
2. To evaluate any relationship between edentulous denture wearer patient and malnutrition.
3. To determine if the recommended dietary allowance is met by elderly dentulous and completely edentulous patients wearing complete dentures.
4. To find out the need of nutritional supplement for edentulous complete denture wearer patients.

Material and Methods

Sample selection: Source of Data - A total of 100 healthy Male and Female patients between the age of 60 to 80 years attending the OPD of Department of Prosthodontics, Faculty of Dental Sciences, Dharmsinh Desai University, Nadiad, Gujarat, India were selected and divided into two sample groups subject to the inclusion and exclusion criteria.

Inclusion criteria: Age: Between 60- 80 years, Subjects without minor diseases like common cold, fever in last 15 days were selected, Subjects with no natural teeth who reported wearing maxillary and mandibular complete dentures for at least 6 months were taken as the edentulous sample. Subjects with at least 24 teeth who do not wear dentures were taken as dentulous sample.

Exclusion criteria: Patients diagnosed with major systemic diseases affecting the diet pattern or intake.(eg: cardiovascular and cerebrovascular diseases, diabetes mellitus, renal diseases oral cancer etc.)**.** Patients with any condition that could impair normal nutritional intake. (eg: xerostomia,

dysphagia)**.** Patients with reported food allergies. Patients with poor quality dentures or those with poor retention, stability, or support. Patients with Temporomandibular joint dysfunction. Patients with severe attrition of natural teeth. Patients with periodontal conditions which might hamper masticatory efficiency.

Mini Nutrition Assessment Tool (MNA) - MNA is a screening tool to help identify elderly persons who are malnourished or at risk of malnutrition. MNA is an excellent tool for the research setting. It may provide additional information about the causes of malnutrition in persons identified as malnourished or at risk for malnutrition. The MNA was developed by Nestlé and leading international geriatricians. Well validated in international studies in a variety of settings[5,6,7], the MNA correlates with morbidity and mortality.

24 hours recall method: Twenty-four hour diet recall interview is a quantitative research method used in nutritional assessment, and asks individuals to recall foods and beverage they consumed in the twenty-four hours prior to the interview[8].

Food Frequency: The food frequency approach asks respondents to report their usual frequency of consumption of each food. Overall nutrient intake estimates are derived by summing over all foods.

Energy Requirement of Indian Men and Women at Age > 60 Years and different Body Weights: The data on food consumption was converted to the nutrient content of the diet and the percentage of recommended dietary allowance (RDA) in calorie was calculated for major nutrients. Based on the nutritive values given by National Institute of Nutrition, Hyderabad for Indian food[9], the nutritional intake of each patient per day was calculated. Based on the recommended dietary allowance for the Indian population given by the National Institute of Nutrition, Hyderabad (1990)[10], percentage of RDA in calorie taken by the patient was calculated for dentulous and edentulous patients individually. A comparative analysis of the same was done.

Results

In the present study out of total 100 elderly patients evaluated, 23 (46%) were male and 27 (56%) were female among 50 dentulous subjects; while 37 (74%) were male and 13 (26%) were female among 50 edentulous subjects(Table I).

BMI classification: Body Mass Index (BMI) is a simple index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults.

In present study we have found that 10% of the edentulous subjects were having BMI under 18.5 kg/m2 (under weight) while 4% of dentulous subjects belonged to the category. Even though statistically insignificant, maximum subjects in both the categories belonged to >25kg/m2 (over weight) that is total 60% of dentulous and 44% of edentulous subjects. On further division, 38% of dentulous and 28% of edentulous subjects were preobese while those belonging to obese category were 22% and 16% respectively. (Table – II, Chart I).

Discussion

Nutritional Status, Masticatory Function, And Prosthetic Treatment Needs: Four factors are related to dietary selection and the nutritional status of elderly individuals: general health, socioeconomic status, dietary habits, and oral health status (including masticatory function). These factors are mutually related, which means that the cause of a nutritional deficiency is normally multifactorial. The extent to which dietary habits may be influenced by masticatory function and oral health status, as well as whether prosthetic therapy may be beneficial to nutritional status, are examined in this study.

All over the world, tooth loss is seen as being in direct relation to aging[11]. As edentulism prevails among the elderly population and the systemic alteration of aging itself, i.e xerotomia, muscular atrophy and loss of perception may have a negative effect on masticatory function and nutritional status, leading to rejection of some foods due to difficulty of chewing them[11].

The rehabilitation of these individuals with the complete dentures therefore becomes imperative, considering the relevant interference in functions of the stomatognathic system and social, emotional and psychological factors, which may also interfere in the nutritional status.

Edentulism and Masticatory Function: The ability to chew a wide variety of foods of different textures and nutritional values is the principal benefit provided by the teeth. As tooth loss occurs, masticatory efficiency declines[12], and it is natural for humans to alter their dietary intake to compensate for the greater difficulty of eating certain foods[13,12]. Edentulous individuals report significantly more chewing difficulties than dentate people, and they therefore constitute the group most likely to change

their diets[14,15]. Harder and coarser foods such as fruits, vegetables and meats, which are typically major sources of vitamins, minerals and proteins, come to be regarded as either difficult or nearly impossible to chew. Consequently, a tendency to favor softer, more processed foods develops. However, these latter foods are typically fairly high in fat and cholesterol content and may also be lacking in vitamins and minerals

It was observed in this study that only 62% of the edentulous subjects were taking fruits frequently against 88% of dentulous subjects. In the same way, while 54% of dentulous subjects were consuming nuts and oil seeds, like peanuts, only 36% of edentulous subjects consumed them & the result is statistically significant. This result shows the decreased inclination of edentulous subjects towards hard to chew food like raw fruits, nuts and oilseeds. (Table 3).

Numerous studies have provided strong evidence of an association between diminished masticatory function and the amount of fruits, vegetables, meats and breads that individuals consume. Wayler and Chauncey[12] examined a sample of 814 subjects. After comparing the frequency of ingestion of hard and soft foods, along with their ratings of chewing difficulty, the researchers concluded that "shifts in food selection patterns result from impairments in masticatory ability and appear to depend on the degree of impairment." Brodeur and others[16] noted a significantly higher intake of fruits and vegetables (by 13%) in subjects with high masticatory ability than in a group with low masticatory ability, whereas Johansson and others[17] witnessed a noteworthy lack of intake of fruits, vegetables and fiber in a group of edentulous men

In our study on calculating total calorie intake according to percentage of RDA, it was found that only 42% of dentulous and 38% of edentulous subjects consumed 76 to 100% of RDA. Although statistically insignificant, almost half of subjects from both the groups i.e. 52% of dentulous and 44% of edentulous subjects were consuming only 51 to 75% of RDA. 12% of edentulous subjects were taking 26 to 50% of calorie of RDA, none of the dentulous subject belonged to this category (Table 4, Chart-II).

There is a direct relationship between edentulousness and malnutrition. 94% of the dentulous subjects in our study were well nourished according to MNA having score from 24 to 30 against 62% of edentulous subjects. The risk of malnutrition was eight times higher in edentulous as compared to dentulous subjects, 34% & 4% respectively which is highly significant statistically. Only negligible portion was malnourished that was 2% for dentulous and 4% for edentulous subjects (Table-V, Chart-III).

Further, there is a positive correlation between the MNA score and calorie intake per day in percentage of RDA. All the subjects detected to be malnourished were taking less than 75% of RDA calorie intake. Amongst 17 edentulous subjects (34%) at risk of malnutrition, more than half (n=10) were consuming less than 75% of RDA. (Table-VI, Chart-V)

A total of 100 healthy Male and Female patients (50 dentulous and 50 edentulous) between the age of 60 to 80 years attending the OPD of Department of Prosthodontics, Faculty of Dental Sciences, Dharmsinh Desai University, Nadiad, Gujarat were selected and evaluated for their nutritional status using MNA tool and dietary intake using 24 Hour Diet Recall & Food Frequency Form. The result was analyzed using the Chi square P value test.

The results have proved our null hypothesis to be wrong that "There is no difference in the nutritional intake of the dentulous patients and edentulous patients wearing complete dentures".

It was observed in this study that only 62% of the edentulous subjects were taking fruits frequently against 88% of dentulous subjects. In the same way, while 54% of dentulous subjects were consuming nuts and oil seeds, only 36% of edentulous subjects consumed them & the result is statistically significant.

Undernutrition as well as obesity were common health hazards in our geriatric population.

As per presumptive diagnosis according to BMI, the maximum subjects in both the categories belonged to >25kg/m2 (over weight) that is total 60% of dentulous and 44% of edentulous subjects. On further division, 38% of dentulous and 28% of edentulous subjects were pre obese while those belonging to obese category were 22% and 16% respectively.

There was a direct relationship between edentulousness and malnutrition. 94% of the dentulous subjects in our study were well nourished according to MNA having score from 24 to 30 against 62% of edentulous subjects. The risk of malnutrition was eight times higher in edentulous as compared to dentulous subjects, 34% & 4% respectively which is highly significant statistically.

Only negligible portion was malnourished that was 2% for dentulous and 4% for edentulous subjects. Further, there was a positive correlation between the MNA score and calorie intake per day in percentage of RDA. All the subjects detected to be malnourished were taking less than 75% of RDA calorie intake. Amongst 17 edentulous subjects (34%) at risk of malnutrition, more than half (n=10) were consuming less than 75% of RDA.

Conclusion

- Obesity as well as under nutrition were common health hazards in our geriatric population.
- Edentulous subjects consumed less amount of fruits and nuts and oil seeds.
- There was a direct relationship between edentulousness and malnutrition. The risk of malnutrition was eight times higher in edentulous as compared to dentulous subjects.
- There was a positive correlation between the MNA score and calorie intake per day in percentage of RDA. All the subjects detected to be malnourished were taking less than 75% of RDA calorie intake. Amongst edentulous subjects at risk of malnutrition, more than half were consuming less than 75% of RDA.

Recommendation

- Early management by nutritional intervention, combined with oral health care, is of great importance for the improvement of nutritional parameters and the prognosis of prosthetic treatment.
- In order to maintain, or even improve nutritional status, it may be necessary to modify the patient's dietary habits.
- There is a need for more research that could point towards solutions with regard to the question of nutrition of the elderly. The situation is critical, more so because the index of completely edentulous persons is high in persons over the age of 60 years. The potential rewards in terms of improved quality of life of elderly and especially edentulous are enormous.

Authors Contribution

BM: planned, collected data, analyzed and wrote the manuscript and carried out this study as a part of her dissertation work in MSc (DFSM). VA: planned, developed the methodology and assisted in writing the manuscript. RM: assisted in data collection, analysis and writing of the manuscript in the study.

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References

1. Irudaya RS. Demography of ageing. In: Dey AB, editor. Ageing in India, Situational analysis and planning for the future. New Delhi: Rakmo Press; 2003.
2. Mishra US, Irudaya RS, and Sarma PS. eds. India's Elderly: Burden Or Challenge? New Delhi: Sage Publi-cations and London: Thousand Oaks, 1999.
3. Irudaya RS, Sarma PS, Mishra US. Foundation of Aging In India In: Liebig P, Irudaya R.S., eds. An Aging India: perspectives, prospects and policies, Haworth Press; 2003.
4. Guigoz Y. The Mini Nutritional Assessment (MNA) review of the literature--What does it tell us**?** Journal Nutr Health Aging 2006; 10 (6):466-85.
5. Guigoz Y, Vellas J, Garry P (1994). Mini Nutritional Assessment: A practical assessment tool for grading the nutritional state of elderly patients. *Facts Res Gerontol 4* (supp. 2):15-59.
6. Guigoz Y. The Mini-Nutritional Assessment (MNA®) review of the literature – what does it tell us? *J Nutr Health Aging* 2006;10:466-485.
7. Murphy MC, Brooks CN, New SA, Lumbers ML. The use of the Mini Nutritional Assessment (MNA) tool in elderly orthopaedic patients. *Eur J Clin Nutr* 2000;54:555-562.
8. Bernard, Russel H. (2006). Research Methods in Anthropology: Qualitative and Quantitative Approaches. Walnut Creek: Altamira Press.
9. Swaran Pasricha and L.M.Rebello . Some Common Indian recipes and their Nutritive Values (Fourth edition 1977, Peprinted 2002) , National Institute of Nutrition , Hyderabad.
10. Gopalan C, Ramshastri BV, Balasubramanian SC. Nutritive value of Indian foods : National Institute of Nutrition,Hyderabad , 1989.
11. Budtz-Jørgensen, E; Chung JP.; Mojon, P. Successful aging – the case for prosthetic therapy. *J Public Health Dent*. 2000; 60(4): 308-12.
12. Wayler AH, Chauncey HH. Impact of complete dentures and impaired natural dentition on masticatory performance and food choice in healthy aging men. *J Prosthet Dent* 1983; 49(3):427-33.
13. Wayler AH, Muench ME, Kapur KK, Chauncey HH. Masticatory performance and food acceptability in persons with removable partial dentures, full dentures and intact natural dentition. *J Gerontol* 1984;39(3):284-9.
14. Fontijn-Tekamp FA, van't Hof MA, Slater AP, van Waas MA. The state of dentition in relation to nutrition in elderly Europeans in the SENECA study of 1993. *Eur J Clin Nutr* 1996; 50(Suppl 2):S117-22.
15. Greksa LP, Parraga IM, Clark CA. The dietary adequacy of edentulous older adults. *J Prosthet Dent* 1995; 73(2):142-5.
16. Brodeur JM, Laurin D, Vallee R, Lachapelle D. Nutrient intake and gastrointestinal disorders related to masticatory performance in the edentulous elderly. *J Prosthet Dent* 1993; 70(5):468-73.
17. Johansson I, Tidehag P, Lundberg V, Hallmans G. Dental status, diet and cardiovascular risk factors in middle-aged

people in northern Sweden. *Community Dent Oral Epidemiol* 1994; 22(6):431-6.

Tables

TABLE 1 DISTRIBUTION OF SUBJECTS ACCORDING TO GENDER

GROUP	MALE		FEMALE	
	N	%	N	%
DENTULOUS	23	46	27	54
EDENTULOUS	37	74	13	26

TABLE 2 DISTRIBUTION OF SUBJECTS ACCORDING TO BMI PRESUMPTIVE DIAGNOSIS

	Presumptive diagnosis according to BMI									
	Underweight (BMI <18.5 kg/m^2)		Normal range (BMI 18.5 to 24.99 kg/m^2)		Overweight (BMI≥25 kg/m^2)		Pre-obese(BMI 25.0 to 29.99 kg/m^2)		Obese (BMI ≥30.0 kg/m^2)	
	N	%	N	%	N	%	N	%	N	%
Dentulous	2	4	18	36	30	60	19	38	11	22
Edentulous	5	10	23	46	22	44	14	28	8	16

Chi-Square P Value 0.417: statistically insignificant

TABLE 3 PERCENTAGE DISTRIBUTION BASED ON FREQUENCY OF FOOD GROUPS' INTAKE

FOOD GROUPS	DENTULOUS				EDENTULOUS			
	FREQUENTLY		NONFREQUENTLY		FREQUENTLY		NONFREQUENTLY	
	N	%	N	%	N	%	N	%
CEREALS	50	100	0	0	50	100	0	0
PULSES	49	98	1	2	47	94	3	6
GREEN LEAFY VEGETABLES	33	66	17	34	35	70	15	30
FRUITS	44	88	6	12	31	62	19	38
MILK & MILK PRODUCTS	43	86	7	14	47	94	3	6
OILS & FAT	50	100	0	0	50	100	0	0
NON VEG FOOD	1	2	49	98	3	6	47	94
ROOTS & TUBERS	46	92	4	8	45	90	5	10
OTHER VEGETABLES	41	82	9	18	41	82	9	18
NUTS & OIL SEEDS	27	54	23	46	18	36	32	64
CONDIMENTS & SPICES	50	100	0	0	47	94	3	6
SUGARS	50	100	0	0	50	100	0	0

Chi-Square p Value <0.0001: statistically significant

TABLE 4 TOTAL CALROE INTAKE ACCORDING TO PRECENTAGE OF RDA

GROUP	Percentage of Recommended Dietary Allowance (RDA)							
	>100 %		76 TO 100%		51 TO 75%		26 TO 50%	
	N	%	N	%	N	%	N	%
DENTULOUS	3	6	21	42	26	52	0	0
EDENTULOUS	3	6	19	38	22	44	6	12

Chi-Square P Value 0.092: statistically insignificant

TABLE 5

GROUP	MNA					
	WELL NOURISHED (SCORE 24 TO 30)		AT RISK OF MALNUTRITION (SCORE 17 TO 23.5)		MALNOURISHED (SCORE <17)	
	N	%	N	%	N	%
DENTULOUS	47	94	2	4	1	2
EDENTULOUS	31	62	17	34	2	4

Chi-Square P Value <0.0001: statistically significant

TABLE 6 MALNUTRITION INDICATOR SCPRE IN RELATION WITH CALORIE INTAKE PER DAY IN PERCENTAGE OF RDA

GROUP	WELL NOURISHED (SCORE 24 TO 30)										AT RISK OF MALNUTRITION (SCORE 17 TO 23.5)										MALNOURISHED (SCORE <17)									
	TOTAL		>100		76 TO 100		51 TO 75		26 TO 50		TOTAL		>100		76 TO 100		51 TO 75		26 TO 50		TOTAL		>100		76 TO 100		51 TO 75		26 TO 50	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
DENTULOUS	47	94	3	6	19	38	25	50	0	0	2	4	0	0	2	4	0	0	0	0	1	2	0	0	0	0	1	2	0	0
EDENTULOUS	31	62	3	6	12	24	15	30	1	2	17	34	0	0	7	14	6	12	4	8	2	4	0	0	0	0	1	2	1	2
	Chi square=1.8 P value>0.05 (difference is Not significant)										For group<75 and >75 Chi square =0.6 and Pvalue >0.05 (difference is not significant)										Chi square can not be calculated as findings are almost NIL									

Figures

FIGURE 1

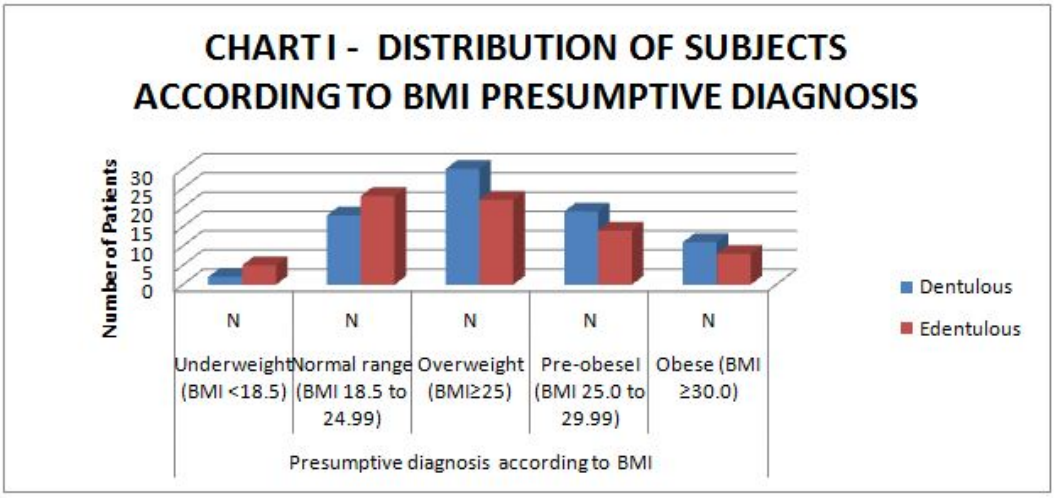

FIGURE 2

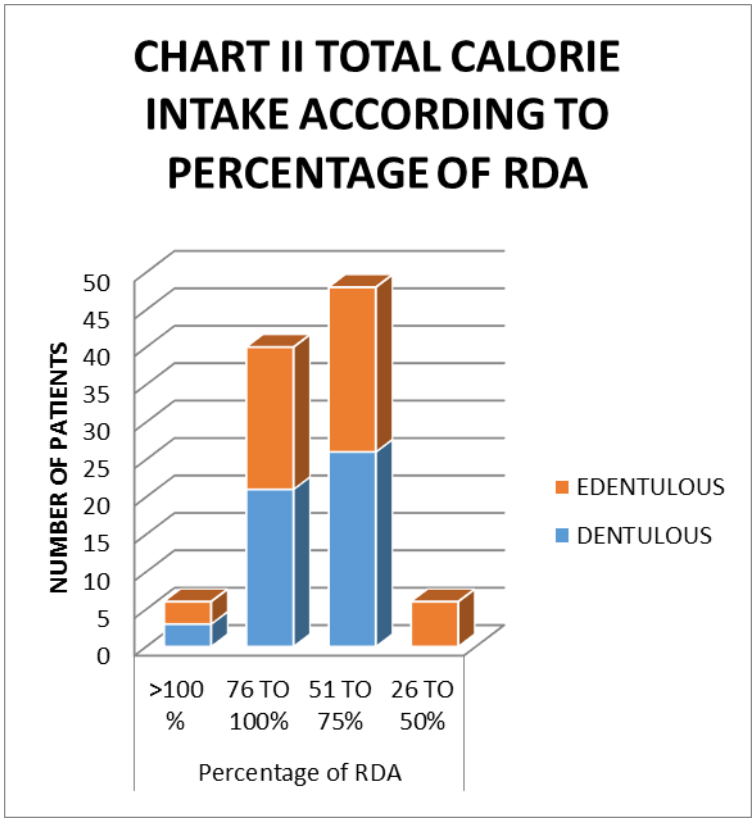
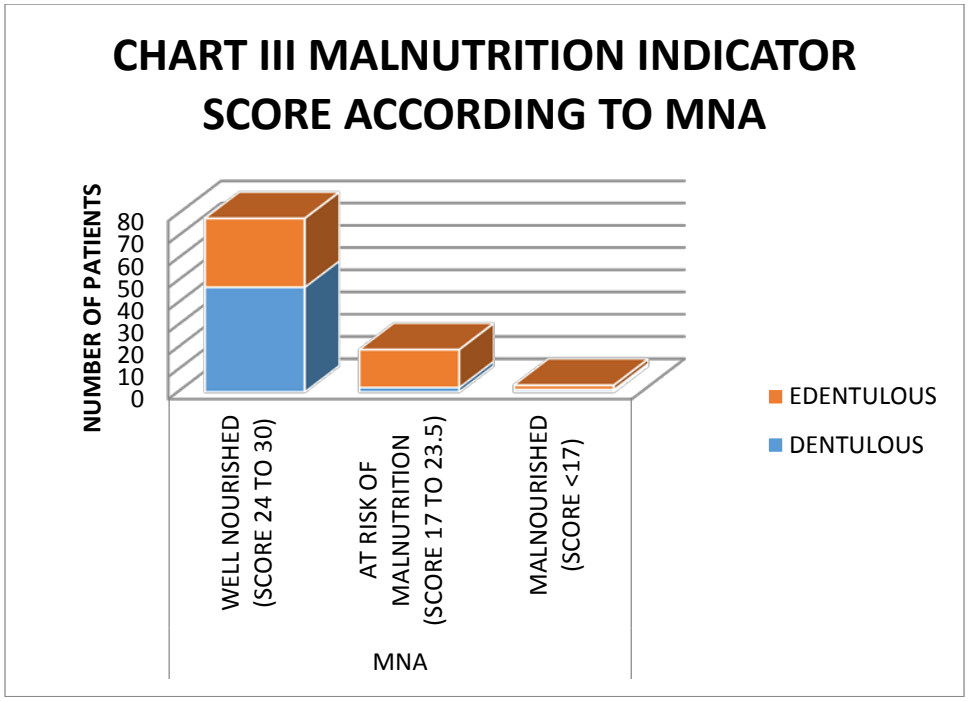
FIGURE 3