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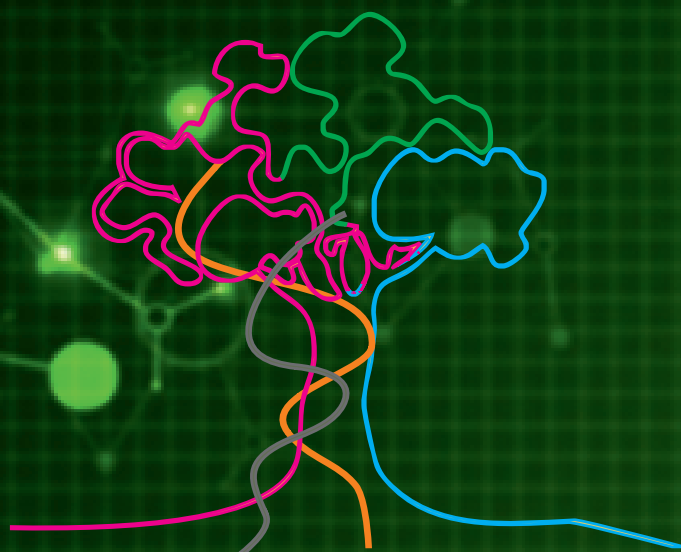Research Articles in **Science**

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Research Articles in **Science**

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Contents

"A Cross-Sectional Study to Compare the Occurrence of Anemiaamong Diabetic Patients with and without Nephropathy"

Athira V Nair
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Abstract:

The study, titled "A Cross-Sectional Study to Compare the Occurrence of Anemia among Diabetic Patients with and without Nephropathy," aimed to assess the prevalence of anemia in diabetic patients and explore potential positive or negative influences of dietary habits. Additionally, the study sought to identify other predisposing factors for anemia in a population of type 2 diabetic patients.

For the study, 200 samples were purposively selected, including 120 samples without diabetic nephropathy from Thazhavagrama Panchayat, Kollam, and 80 samples with diabetic nephropathy from Valiyath Institute of Medical Sciences, Karunagapally, Kollam. The research employed a survey method, and data were collected using a structured closed-ended questionnaire.

The findings revealed a higher occurrence of anemia in diabetic patients with nephropathy compared to those without nephropathy. This disparity was attributed to renal insufficiency in the nephropathy group and was identified as multifactorial in cases of diabetes without nephropathy. Inadequate dietary habits were also identified as a contributing factor to the progression of anemia among the subjects.

Introduction

Diabetes mellitus (DM) is a set of metabolic disorders with various aetiologies that are defined by persistent high blood glucose levels caused by disturbances in carbohydrate, lipid, and protein metabolism. It happens when the pancreas doesn't make enough insulin or when the body can't use the insulin it does make adequately. Insulin is a hormone that helps to keep blood sugar levels under control. According to the World Health Organization, Anemia is defined as hemoglobin (Hb) levels <12.0 g/dL in women and <13.0 g/dL in men. Anemia occurs when the number of red blood cells (RBCs) decreases and, as a result, their oxygen-carrying ability is insufficient to meet the body's physiological needs.

Diabetes does not directly cause anemia, but certain complications and conditions associated with diabetes can contribute to it. Anemia is a typical finding in diabetic patients, and it has a severe influence on their sense of well-being. It also inhibits their capacity to work, lowers their quality of life, and deteriorates their cardiovascular health. (Feteh et al., 2016)

Diabetes mellitus is a chronic inflammatory disease, systemic inflammation has been postulated as a key component in developing anemia in type 2 diabetes patients who do not have renal involvement.(Praveen et al., 2020)the frequency of anaemia rises with age in diabetic patients. Anti-diabetic drugs like metformin cause vitamin B12 deficiency thus leading to anemia People with diabetes can also have anemia as a result of not eating well or of having a condition that interferes with the absorption of nutrients. Anemia was thirteen times more prevalent in diabetic patients with renal insufficiency. This can be explained by erythropoietin depletion, which increases the erythropoiesis process, as a result of renal fibrosis-induced kidney damage. (Atlaw& Tariku, 2021)

Objectives of the study

- To determine the socio-economic status, lifestyle patterns and knowledge level of the samples
- To assess the nutritional status of the samples by anthropometric, biochemical, clinical and dietary methods.
- To assess the Predisposing factors of anemia among samples
- To consolidate the data and evaluate the statistical analysis by the SPSS method.

Hypothesis of the study

There is a significant difference between hemoglobin levels of the selected sub samples

There is a significant difference between creatinine levels of the selected sub samples

Materials and Methods

The study was conducted at Valiyath institute of medical sciences, Karunagapally, Kollam and thazhava panchayath in the Kollam district. To conduct the study 200 samples were selected, of which 120 were samples without diabetic nephropathy selected from thazhava panchayath in Kollam district and 80 samples with diabetic nephropathy selected from Valiyath institute of medical sciences, Karunagapally, Kollam. The samples were selected purposively. The information from the samples was collected through a direct survey and a telephonic survey with a closed-ended questionnaire. Information on demographic details, socioeconomic status, lifestyle patterns, knowledge assessment, predisposing factors of anemia and dietary patterns of all the subjects were elicited by using a pre-constructed questionnaire. Assessment of nutritional status was done by using ABCD analysis; Anthropometric measurements of all samples were collected. Among hospitalized patients, the anthropometric measurements were obtained from the case sheet and are compared with standards. 30 subsamples were subjected to biochemical estimation of hemoglobin and creatinine and were undertaken by laboratory methods. Clinical examination of the samples was done with the help of a checklist. Dietary assessment was done by using a dietary pattern assessment and a food frequency questionnaire. After

the survey, the pieces of information were tabulated and interpreted using appropriate statistical tools.

Results:

Two distinct groups were studied in the survey; 120 samples without diabetic nephropathy and 80 samples with diabetic nephropathy. The study reveals that the overall hemoglobin status of the samples without diabetic nephropathy is better than samples with diabetic nephropathy, which is expressed through anthropometric assessment, biochemical estimation, (Fig.1) clinical examination, and dietary assessment. Factors like longer diabetic duration , longtime use of metformin etc may be predisposing factors of anemia in samples .Apart from this samples with diabetic nephropathy experienced more restrictions in intake of nutrient rich foods due to kidney impairment which all together contributed to anemia in them.

Discussions:

using SPSS software it was found that, in the case of HB scores, t (28) = 2.607 with P-Value is 0.0003. Here P- Value is less than α=0.05. That means the test is statistically significant at α = 0.05. So, it is concluded that there is a significant difference between the Hb scores of samples with and without Nephropathy. Samples with and without Nephropathy differ significantly in Creatinine scores because t (23) = -6.705 and P-Value is 0.001 which is less than 0.05. (Table 1) So, reject the null hypothesis at a 5% level of significance. Here the two groups differed significantly with a mean difference of -2.68. That is,

samples with diabetic nephropathy have higher creatinine than samples without diabetic nephropathy.

Conclusion:

 The study was undertaken to assess the occurrence of anemia among diabetic patients with and without diabetic nephropathy. The study reveals that the overall hemoglobin status of the samples without diabetic nephropathy is better than samples with diabetic nephropathy, which is expressed through anthropometric assessment, biochemical estimation, clinical examination, and dietary assessment.

In this study, most study subjects were belonging to poor socioeconomic status and are less aware of the complications of anemia and diabetes. According to anthropometric analysis, the occurrence of pre-obesity among samples was the same.

The occurrence of anemia is more in diabetic nephropathy when compared to the diabetic population without nephropathy. By assessing the hemoglobin and creatinine levels of the selected samples, those with nephropathy had decreased hemoglobin levels with elevated creatinine levels this indicates that anemia was caused due to renal insufficiency. Those samples without nephropathy had low hemoglobin levels with normal creatinine levels which shows that anemia in diabetes without nephropathy had multifactorial causes like nutritional deficiencies, diabetic duration, complications, use of metformin etc. By assessing the dietary patterns, it was found that samples

without nephropathy were unaware of the importance of consumption of foods rich in iron, folate, vitamin B12, and vitamin C and about the dietary habits that contribute to and prevent anemia. Study samples with nephropathy were also unaware of the food choices which in turn leads to the progression of renal impairment and manifestations of anemia.

Table 1: comparison of hemoglobin and creatinine values of the selected samples with and without diabetic nephropathy

	T	Df	P-Value	Mean-Difference	Std. Error-Difference
Hemoglobin	4.085	28	0.0003	2.607	0.638
Creatinine	-6.705	23	0.001	-2.680	0.400

Figure 1: Hemoglobin levels of the samples with and without nephropathy
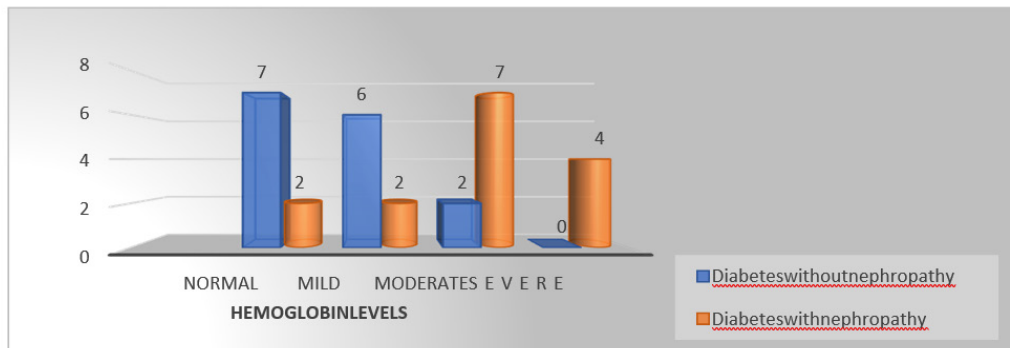
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Advantages of Meal Replacement Therapies

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ABSTRACT

Obesity, a metabolic disorder characterized by increased accumulation of fat in adipose tissue is manifested by certain morphological changes and excessive body weight. As in this century obesity has become a rising epidemic, Meal replacement therapy have shown significant result in managing obesity. It is an effective tool for weight loss and for improving various other clinical characteristics. The study includes Meal replacement therapy, its advantages and effects on weight loss.

INTRODUCTION

In patients with obesity and other clinical characteristics, meal replacement plans is an effective tool for weight loss as it focuses on energy restriction that helps to cut down calorie intake by considering the patient's health condition. When there is a chronic imbalance between intake of energy and expenditure of energy it leads to the development of obesity. Long – term negative energy balance plays a major role in promoting weight loss that includes energy restricted meal replacements plans which is a safe and an effective strategy for weight management. Life style changes are also essential along with partial or whole meal replacement plans where a person's daily routine is altered and changed in to a healthy lifestyle. Patients are advised and counseled for adopting and following new eating habits and behaviors, and is educated about the importance of healthy food choices and improved lifestyle. Physiological response to these may vary heterogeneously according to different individuals. Certain studies regarding weight loss are performed with a Very low calorie (VLCD) or a Low calorie diet (LCD) which is not easy for obese patients to follow in the current World setting as it includes cutting down of calories by avoiding certain food items rather than replacing them with low calorie healthy food options. Moderate energy restricted meal replacement helps in resolving this issue.

MEAL REPLACEMENT THERAPY

Meal replacement plans includes commercial products fortified with minerals and vitamins that include a partial or whole meal replacement. Partial meal replacement plans have shown a greater effect for long – term weight management. Meal replacement plans helps in ensuring effective calorie – restriction by executing excellent proportion control and restricting high

calorie foods. High calorie foods can be replaced with high or moderate protein, low calorie or low carbohydrate food options which are known to be Meal replacers in order to promote weight loss in an appreciable degree. The results of meal replacement therapies may vary differently according to gender specific physiologic differences. Some studies have come up with a conclusion that Meal replacement has the same effect on weight loss when compared with other structural weight loss diets.

ADVANTAGES OF MEAL REPLACEMENT THERAPY

Certain research studies have come up with a result of clinically relevant weight loss and metabolic improvements by following moderate energy restriction through partial meal replacement. Some other relevant researches have come up with a conclusion that individualized Meal Replacement therapy by introducing meal replacement options with a low Glycemic index improves long – term Glycemic control in poorly controlled Type 2 Diabetes patients and further improvement were noted in cardio metabolic parameters. Certain advantages of Meal Replacement Therapies on other weight loss diets are listed below:

Portion control is another important factor in weight loss intervention and that can be achieved with the help of meal replacement plans.

Better Nutritional knowledge provided for both the patient and family can help in achieving appropriate diet and lifestyle management.

Patient is prone to give more importance in following a healthy lifestyle by opting healthy food choices that can be meal replacers.

As the patient is obese, his diet may include high calories, low fat and poor quality food options that can lead to nutritional deficiencies or excessiveness which should be corrected through modified diet plans and eating behaviors. These nutritional deficiencies can be corrected by advising vitamin tablets or mineral rich foods.

In order to prevent relapse or weight regain, restrict consumption of high calorie, high fat foods, avoid binge eating and grazing and follow a long term management of diet and lifestyle.

Follow up sessions should be made more motivating and interesting in order to reduce the exhaustion in following long term diet plans, continuous self – monitoring and anthropometric measurements.

Neuropathy caused by nutrient deficient food intake caused when patient fails to meet the required protein and calorie intake, certain vitamin and mineral deficiencies, etc which can lead to other physiological conditions can be prevented by providing multi-vitamin tablets (containing Vitamin D, vitamin B12, vitamin A, vitamin K, vitamin E, vitamin, etc,) or certain mineral supplements (containing Calcium, Iron, Folic acid, Zinc, Copper, Selenium, Thiamin, etc) in accordance with the deficiency.

Alteration in sedentary behavior of the patient where he/she fails in doing

exercise or other physical activities adequately in order to burn the calories and to increase caloric expenditure that promotes weightloss.

Dietitians should focus more on the understanding level of the patient and his/her family members in order to make sure whether the patients are able to follow the diet advice.

Unhealthy food choices and eating behaviors even after knowing about the after effects of taking such high calorie, high fat and poor quality foods can be altered with the help of meal replacers.

Alcohol consumption affects weight loss as it is a high calorie drink and may cause certain nutritional deficiencies like Vitamin B deficiency.

Unwillingness or fear on taking Oral Nutrition Supplements which is highly essential to meet the protein requirements while opting meal replacers. (Reccomended protein intake of an average adult per day is approximately 45 – 50 g/ day).

Dehydration is another common scenario seen in obese patients following meal replacement therapies and can be overcome by keeping the body hydrated (Consumption of 1.5 – 2 L/day is the Reccomended fluid intake).

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A Cross-Sectional Pilot Study on Hypertension Among Adults and Introduction of Rainbow Diet among them

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Abstract

Hypertension (High Blood Pressure) is a condition in which the force exerted by the blood against the artery wall becomes high. As age increases, the risk of hypertension also increases. Hypertension is known as the "silent killer" because most people with hypertension or high blood pressure do not have any symptoms. High blood pressure increases the risk of cardiovascular diseases and stroke. Objectives-1) To assess the hypertension of adults in relation with their age and sex. (2) To assess the BMI and dietary patterns of the respondents. (3) To assess the Knowledge, Attitude and Practice among the samples and to provide nutritional education and the introduction of Rainbow Diet.Methods and Materials: A cross-sectional pilot study was conducted among 75 samples in a rural village of Pathanamthitta District,Kerala,using survey method. Both open ended and close ended questions were included. Purposive sampling method was adopted. KAP questionnaires were used for nutritional education. Results: The predominance of hypertension was 61.33% in males and 38.67% in females. People in the late 60's were more hypertensive with a percentage of 60. People with normal BMI experience more hypertension (50.67%). Based on the dietary habits, non-vegetarians were prone to be more hypertensive (98.67%). Statistical analysis shows that there is an association with BMI and Hypertension. The lack of knowledge and practice of preventing hypertension among the samples were poor and hence nutritional education was provided by the introduction of Rainbow Diet. Conclusion: Hypertension being a serious health disorder with affection on various other organs of the body needs to be identified as soon as possible in the susceptible population and they need to be aware of preventive steps and the dietary modifications that can be undertaken by them to halt the progress of their condition.

Keywords: Hypertension, Rainbow Diet, Body Mass Index, Dietary patterns, Purposive Sampling, Questionnaire.

Introduction

Hypertension is a condition in which the force exerted by the blood against the artery wall becomes high. As age increases the risk of hypertension also increases. Hypertension is known as the "silent killer" because most people with hypertension or high blood pressure have note seen any symptoms. High blood pressure increases the risk of cardiovascular diseases and stroke. Medications and lifestyle changes that promote heart health are among the treatments for high blood pressure. Change in lifestyle. These adjustments,

like exercising and eating heart-healthy eating, it is very effective. But sometimes the changes do not control or lower high blood pressure. They might need medicine. There are different types of blood pressure medicines. Some people need to take more than one type. The blood pressure is caused by another medical condition or medicine, treating that condition or stopping the medicine may lower blood pressure. Hypertension is a major contributor to vascular injury and atherosclerotic disease and is the main risk factor for cardiovascular events, including strokes Hypertension is the common disease found worldwide it increases the chance of death.

Objectives 1.

To assess the prevalence of hypertension among adults in relation with their age and sex.2.To assess the BMI and dietary patterns of the sampless.3.To assess the Knowledge, Attitude and Practice among the samples and to provide nutritional education and the introduction of Rainbow Diet.

Methods and Materials:

The study was conducted using questionnaire survey method and purposive sampling method was adopted. Survey is defined as a systematic collection of facts about people living in a specific geographic cultural or administrative area. (Sociological dictionary).Selection of Area The study was conducted in a rural village of Pathanamthitta. Selection of samples Purposive sampling is a type of sampling in which samples are selected from a population focusing on the purpose of study or research.75 samples were taken for the study. Tools and methods applied.Survey method was employed for the conduct of the study with appropriate questionnaire to collect the data.A well-structured questionnaire consisting of both open ended and closed ended questions were used for conducting the survey. Socio economic standing and demographic information.Demographic & socio economic details including name, sex, age, education, occupation, retirement year, and present employment are all examples of general information. A questionnaire was used to obtain information about the individual's socioeconomic statuses, such as education and occupation, monthly family income, and dwelling area of the 75 samples.Life style patterns Lifestyle patterns are the underlying latent variables including physical activity, anxiety status, dietary patterns and smoking. Assessment of nutritional status of the samples For present study anthropometric measurement such as height, weight of the 75 samples were taken and body mass index was calculated for selected samples. The questions regarding dietary pattern of samples were collected which include the type of diet, frequency of food consumption, meal consumption pattern, habits of skipping meals etc. Nutrition education program and introduction of Rainbow Diet to the communityA dietary education program was conducted to assess and enhance the knowledge, practice and attitude of BP patients and importance of rainbow diet for life style diseases The feedback analysis of the nutrition education program includes information

on how much the subject matter piqued their interest, the usefulness of the class, its clarity, their ability to follow along, the language's clarity, the need for the kind of class, and their willingness to share their knowledge with others. The effectiveness of the awareness lesson is evaluated using feedback forms given to 15 people, which enables the researcher to make modifications and address any errors.

Results and Discussion :

The result and discussion pertaining to the entitled "A Cross-Sectional Pilot Study on Hypertension among Adults and Introduction of Rainbow Diet among Them" present under the following headings.

4.1 General information of the selected samples

Details regarding the general information of the selected samples with respect to age, sex, religion and marital status, were tabulated and discussed .Out of 75 samples ,61.33 % are male and 38.67 % are female. 40 % under the age group of 50-60 and 60 % are under 60-70 age group and 66.67 % are Christian, 2.67 % are Muslim and 30.66 are Hindu. 98.66 % are married and only 1.34 % are unmarried.

4.2 Socio-economic status of the selected samples

Details regarding the socio-economic status of the selected samples with respect, educational qualification, occupation, nature of job, monthly income, area of residence and type of family were tabulated and discussed. The educational qualification among the 75 BP samples 86.66% are SSLC, 6.67 % are plus two and 5% are degree and 40% are working and 60% are non-working Annual income of the samples shows that, 26.67 % are belong to <6000, 40% are belongs to 6000-10000 and 33.33% are belongs to above 10000. 54.67% of the samples were live in the rural area, 5.33% are live in the urban area and 40% are live in the semi urban and 26.67%were from joint family and 73.33% from nuclear family.

4.3 Life style pattern of the selected samples

Details regarding the life style pattern of selected sample with respect smoker, consumption of alcoholic beverages, sleeping hours, major leisure time activity, travelling pattern, fixed time for sleep, physical activities and suffering from any disease were tabulated and discussed. Out of 75 samples .67 % were smokers. 26.67% are weekly alcohol consumers and 1% are weekly alcoholic consumers. 29.33%of the samples were slept about less than 6 hours, 53.44% of the samples slept about 7 hours and 17.33 %of samples slept 8 hours. It was found that 53.33 %of samples were watching TV, 20% of samples were using mobile phone and 17.33%doing other activities during the leisure time. 30.665 are travelling bus, 50.67 %using car and 14 percent using two wheeler for travelling. About the routine sleep pattern 37.33% had fixed time for sleeping and 62.67% had no fixed time for sleeping. Only 2% of the samples were doing physical activities and 97.33percent were not doing any physical activities Among the 75 samples, 46.66 % had diabetes, 38.66 % had hyperlipidaemia.

4.4 Nutritional status of the selected samples

4.4.1 Anthropometric measurement of the selected samples

The anthropometric measurement such as height and weight were measured using standard procedure and found out Body Mass Index

Table1   BMI Analysis of selected samples   N=75

Sl. No	Nutritional status	BP n=75	
		Number	Percentage (%)
1	Underweight	2	2.67
2	Normal weight	38	50.67
3	Pre-obesity	34	45.33
4	Obesity class I	1	1.33
5	Obesity class II	0	0
6	Obesity class III	0	0

BMI analysis of the selected respondents as shown in table 1,shows that out of the of 75 samples 50.67 % of the samples belong to the group of normal, 2.67% of the samples were from under group, 45% of the samples belongs to pre-obesity group and 1% of the samples were obese class1 group

4.6 Dietary assessment of the selected samples

Details regarding the life dietary assessment of selected samples with respect types of meal consumed, habit of skipping meals, specific time schedule for meals, eating habits, types of cooking preferred, habit of eating out, meal pattern, consume pickle, use of extra dietary salt, prefer fried foods, use of dairy product, green leafy vegetables in your diet, iodine rich food in your diet and fruits and vegetables in meals were tabulated and discussed. Out of 75 samples, 1.33% are vegetarian in BP samples and 98.67 % are non-vegetarian. In BP sample 53.33% are skipping meals 46.67% not skipping meals. 60% are maintain specific time schedule for meals and 40% are not maintain time schedule for meals in BP samples. 50.67% are maintain time for meals and 49.33% are not maintain specific time schedule for meals. 100% samples eating homely food in BP .80% preferred boiling in cooking and 20% are steaming in BP samples. Only 13.33% samples having eating out and 86.67% are not. 10.67% samples have habit for eating out and 89.33% are not. In BP samples 77.33% samples meal pattern 3 meals per day and 22.67% 4 meals per day. 13.33% samples consume pickle twice a week and 86.67% samples consume pickle rarely in BP samples. 10.67% samples consume pickles twice in a week All the BP samples not use extra salt in their diet. Only 1.33% are use extra salt in their diet and 98.67% are not. In BP samples 13.33% are prefer fried foods weekly, 61.33% are monthly, 24% are rarely and only 1.33% occasionally prefer fried foods. 20% are prefer fried foods weekly, 50.67% are monthly and 29.33% are rarely prefer fried food in non BP samples. In BP samples 86.67% are use high amount of dairy product and 13.33% use moderate level dairy product. In non BP samples 77.33% are use high amount dairy product in their diet and 22.67% are use moderate level

dairy product. In BP samples 80% are use green leafy vegetables in their diet and 20% are not. In non BP samples 82.67% are use green leafy vegetables and 17.33% are not use in their diet. 60% are use fiber rich food in diet and 40% not use in BP samples. 64% are use fiber rich food 36% are not use fiber rich food in non BP samples.in BP samples 60%are use iodine rich food and 46.67% are not. In non BP samples 62.67% are use iodine rich food and 37.33% are not. In BP samples 97.33 are use fruits and vegetables and 2.67% are not. In non BP samples 98.67% are use fruits and vegetables and 1.33% are not.

Association between BP and BMIFor testing the association of BMI and BP we apply chi-square test. Chi square test is acceptable when all the expected cell values are greater than one and not more than 20 % of the cells have expected values below 5. Here 4 cells (40.0%) have expected count less than 5. The minimum expected count is .50. So we must reduce columns and rows of Table 1 to satisfy the assumption of chi-square test and it is shown in Table 2

Presence of BP		Level of BMI			Total	Chi square	df	P-value
		Underweight	Normal	Overweight				
Yes	Count	4	35	36	75	23.384	2	0.00001
	Expected Count	6.5	46	22.5	75			

Table 2.Cross tabulation of BMI and BP and Chi-square test values.

Here the test is significant. That is, the association between BP and BMI is significant. Because P-Value less than α (0.05). That is, P-Value of the test is 0.0001 which is lessthan 0.05. Hence we reject the null hypothesis as the two characteristics areindependent. So there is an association between BMI and BP.

Association between BP and Consumption of fried foods

Presence of BP		Consumption of fried foods		Total	Chi square	df	P-value
		No	Yes				
Yes	Count	35	40	75	0.243	1	0.622
	Expected Count	33.5	41.5	75			

Table 3.Cross tabulation of BMI and BP and Chi-square test value

From Table 3 we can see that P-Value of the test is 0.622 which is greater than α = 0.05. Hence we reject the null hypothesis as the two characteristics are independent. That is, the association between BP and Consumption of fried foods is not significant. So BP and Consumption of fried foods are independent as evidence by the data.

Feedback analysis of nutrition education program

Feedback analysis of the nutrition education program among 15 people were conducted, about interesting content majority of 100 percent were interest and none of them were not interest. About useful of class majority of 93 percent had useful class and 7 percent were not useful of class.About understanding the class majority of 87 percent understand the class and the least of 13 percent not understanding the class, majority of 100 percent had clarity of the class.About the language clarity 100 percent had language clarity to the class, majority of 93 percent said to need for this class. And the least of 7 percent don't need class, majority of 93 percent share the knowledge with others and the least of 20 percent will not share knowledge to others

Summary and Conclusion

The major findings if the study can be summarised as follows.

- Among the 150 samples, only 75 of them were hypertensive of which 61.33% are male and 38.67% are female.

- The age of the BP samples 40% of the respondents belong to 50 to 60 category and 60% were in the late 60's.

- The area of residence shows that in BP samples 54.67% were rural, 5.33% were Urban and 25% were semi urban.

- Regarding the physical activity, 97.33% of the respondents were not involved in any physical activity and only 2.67% of them are doing physical activity.

- Majority of the non- smokers i.e. 80% were hypertensive than the respondents who actually smoke i.e. 20%.

- BMI value in BP sample 2.67% were underweight, 50.67% are normal, 45.33% are pre-obesity, and 1.33% are obesity class 1.

- In statistical analysis there is association between BMI and BP.

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"A Study on Obesity and Overweight among the Adults "

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Abstract:

The South Asian region, particularly India, is witnessing a raid increase in obesity rates, with an estimated 135 million obese individuals. The purpose of the study is to make a comparative study on prevalence of obesity and overweight in urban and rural areas. . The research was conducted in Kacheripady (Urban) and Choornikkara (Rural) of Eranakulam District, involving 30 adults (aged 19-59) in each area over a seven-day period (May 15th to May 21st).

Methods: A cross-sectional survey utilized questionnaire methods, BMI calculation, clinical approaches, and anthropometric assessments for data analysis.

Results: The study revealed a notable disparity in overweight and obesity rates between urban and rural areas. In the urban area, the prevalence of overweight among adults was 43.3%, while obesity was observed in 10%. In contrast, the rural area exhibited a lower overweight prevalence of 30%, accompanied by a higher obesity rate of 30%.

Conclusion: The study identified a key factor contributing to the prevalence of obesity and overweight – insufficient physical activity and the predominant dependence on inexpensive foods characterized by low-protein and high-calorie content.

Introduction:

Obesity, recognized as a chronic disease by global health entities like the World Health Organization (WHO), manifests as an increase in fat cell size and quantity, presenting complex aetiology and diverse health consequences. Lacking a universally accepted clinical definition, the Obesity Medicine Association defines it as a chronic, relapsing, multi-factorial, neurobehavioral disease, wherein an increase in body fat promotes adipose tissue dysfunction and abnormal fat mass physical forces, resulting in adverse metabolic, biomechanical, and psychosocial health consequences. The WHO identifies obesity as a significant risk factor for noncommunicable diseases, such as heart disease, stroke, diabetes, and various cancers, contributing to socio-economic challenges globally.

The pandemic proportions of obesity are evident as more than 1.9 billion adults (39%) were overweight, and over 650 million (13%) were obese in 2016, with escalating prevalence noted in South Asia, Southeast Asia, the Caribbean, and Southern Latin America. Projecting forward, nearly half of the world's population may be

overweight or obese by 2030. While extensively studied for its association with type 2 diabetes and cardiovascular morbidity, obesity's neurological components, including cerebral insulin resistance, are emerging focal points. Furthermore, evidence suggests a three-fold increase in Alzheimer's disease risk for individuals with obesity but without type 2 diabetes.

Within this global context, the South Asian region, including India, grapples with one of the fastest-growing obesity rates worldwide, with an estimated 135 million obese individuals. The Indian National Family Health Survey-4 highlights a substantial rise in obesity rates from 2005/06 to 2015/16 among women (13% to 21%) and men (9.3% to 19%) aged 15-49.

Recognizing the urgency of the issue, this project was undertaken to comprehensively assess and determine the prevalence of obesity among adults in both urban and rural areas of Kerala, India. The insights gained will inform targeted public policies essential for addressing this escalating health concern.

Objectives of the Study:

- To compare types of obesity in adults by calculating body mass index in different communities.
- To estimate and compare the anthropometric indices of different communities.
- Understand the consequences of overweight and obesity.
- To understand the outlines for the control and prevention of obesity.

- To evaluate health conditions affecting obesity among selected communities.

Hypothesis of the study:

It was found that the rate of Obesity is increasing at an alarming rate among the Rural community compared to Urban. This may not be that visible due to the reason that studies are more conducted in urban areas.

Methods and Techniques:

The purpose of this study was to investigate the extent to which overweight and obesity pose challenges among adults(urban and rural settings) in Ernakulam. That was deemed possible by observing prevalence, causes, and impacts on adults' social, health, and working atmosphere.

The study was conducted in Kacherippady and Choornikkara. The rationale behind this choice is the sense that Ernakulam is one of the metropolitan cities in Kerala. The selection of rural area sites was purposefully made in the Ernakulam district due to the visible difference in lifestyle and dietary habits in different communities (urban and rural). The study period was conducted from May 15 to May 21 (7 days).

The Study includes investigating a population of adults,(aged 19-59) who were considered eligible. Of which 30 were from urban and 30 from rural.

A structured questionnaire based on MNS and clinical measurements was employed to collect the data. Socio-economic factors (age, marital status,

type of physical activity), Dietary survey (type of foods consumed, 24-hour recall method, food frequency checklist), health problems and other measurements including estimation of blood pressure using digital sphygmomanometer ,anthropometric measurements such as height, weight and body mass index were measured.

Results and Discussions

The subjects were divided into four groups according to the age groups; 19-29,30-39,40-49 and 50-59 and it was found that 10 out of 60 samples were in the age group of 19-29,15 out of 60 samples were in the age group of 30-39,11 out of 60 samples were in the age group of 40-49 and 24 out of 60 samples were in the age group of 50-59. The majority of the people taken for the survey were in the age group of 50-59. The subjects were divided into two groups according to their sex; Female and Male, 55% of them were females and 45% of them were males.

The majority of subjects are non-vegetarian in urban and rural areas. And majority of the subjects consumed lunch as their main meal in rural and urban areas The majority of the subjects from urban and rural areas consume cereals daily. Rice was the major cereal consumed at high frequency. Other than nuts, in urban area consumption of sugar was found to be low, and in rural area milk and egg was consumed lesser. The majority of the subjects in rural area follow low carbohydrate, high fibre and low fat diet where as the majority of the subjects in urban area follow high carb, low fibre and low fat diet. Using the 24-hour recall method, it was found that

the majority of the subjects from the rural and urban areas consumed rice as their main meal.

The findings of this study showed a significant difference in the prevalence of obesity in rural (30%) and urban (10%). The Body mass index of the subjects shows that 30% of the subjects in rural were found to be overweight whereas 43% of urban subjects were overweight. The study shows that among the subjects of rural area who were found to be obese, in that 66.7% were Type 2 Obese people and 33.3% were Type 1 Obese people. When it comes to urban area 66.7% were found to be Type 1 Obese people and 33.3% Type 2 Obese people. In both areas, Type 3 Obese people were not found. The study shows that in urban areas, 64% of the subjects were following a sedentary lifestyle whereas in rural 90% were following a sedentary lifestyle. Among the urban sedentary subjects, 12.5% were obese and 50% were found to be overweight. And among the rural sedentary workers, 27.8% were obese and 44.4% were overweight. In urban area, it was found that the majority of the subjects do exercise to control obesity and overweight, and in rural area majority of the subjects do simple physical exercise like walking in order to control obesity and overweight.

The majority of the subjects in rural and urban areas have pre-hypertension. In the urban area, 33.3% of the subjects were suffering from stress; whereas in the rural area, 36.4% were suffering from hypothyroidism, which can be a

leading cause of obesity.

In urban, 62.5% of the subjects had access to public health care facilities whereas the remaining had no access to public health care systems. In rural, 85% of the subjects had access to public health care.
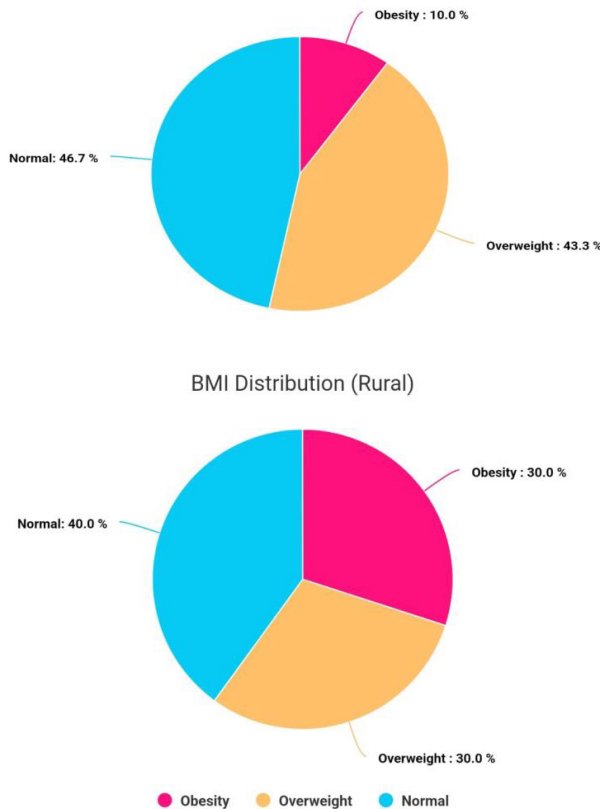
Conclusion

The study shows an increase in the rate of obesity due to lack of physical activity, exercise, or yoga. It also revealed that physical inactivity (sedentary life), health issues, and nutritional status have significant effects on overweight and obesity among adults.

The health issues of the subjects play a vital role in this study as it is closely related to the causes of obesity. Cholesterol, type 2 diabetes mellitus, hypothyroidism, osteoarthritis, stress, and PCOD were found in a good percentage. Both rural and urban subjects opted for exercise and walking as a daily routine to keep their bodies fit. Many in the rural followed a low carbohydrate, high fibre, and low-fat diet and in Urban high carbohydrate, low fibre, and low-fat diet was the most common diet. These Diets were followed by both the community in a good percentage.
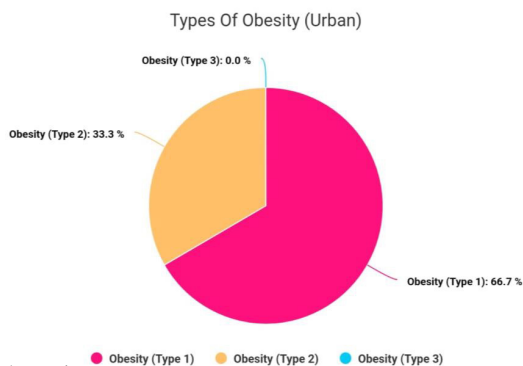
The public distribution system helps in averting widespread hunger and famine by supplying food from surplus regions of the country to the deficit areas. The study shows that the subjects from both Kacherippady and Choornikkara have great access to PDS, giving them more opportunities to have food items easily.

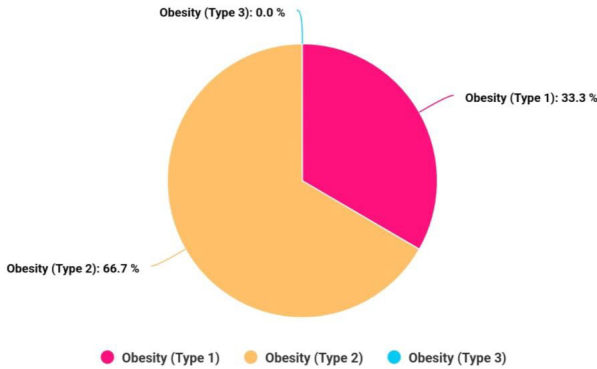Figure 1: Anthropometric Measurement of subjects in urban and rural areas

BMI Distribution(Urban)

Obesity : 10.0 %
Normal: 46.7 %
Overweight : 43.3 %

BMI Distribution (Rural)

Obesity : 30.0 %
Normal: 40.0 %
Overweight : 30.0 %

● Obesity   ● Overweight   ● Normal

b) Rural

Figure 2: Types of Obesity in urban and rural areas

Types Of Obesity (Urban)

Obesity (Type 3): 0.0 %
Obesity (Type 2): 33.3 %
Obesity (Type 1): 66.7 %

● Obesity (Type 1)   ● Obesity (Type 2)   ● Obesity (Type 3)

a) Urban

Types Of Obesity (Rural)

Obesity (Type 3): 0.0 %

Obesity (Type 1): 33.3 %

Obesity (Type 2): 66.7 %

● Obesity (Type 1)   ● Obesity (Type 2)   ● Obesity (Type 3)

b) Rural

Figure 3: Types of Physical Activity followed by subjects in urban and rural areas

Type of Physical Activity

Heavy : 0.0 %

Moderate : 10.0 %

Sedentary : 90.0 %

● Sedentary   ● Moderate   ● Heavy

Rural

Type of Physical Activity

Heavy : 4.0 %

Moderate : 32.0 %

Sedentary : 64.0 %

● Sedentary   ● Moderate   ● Heavy
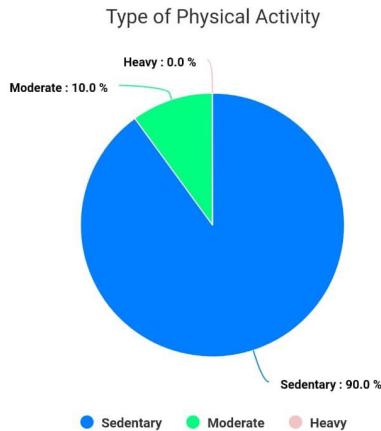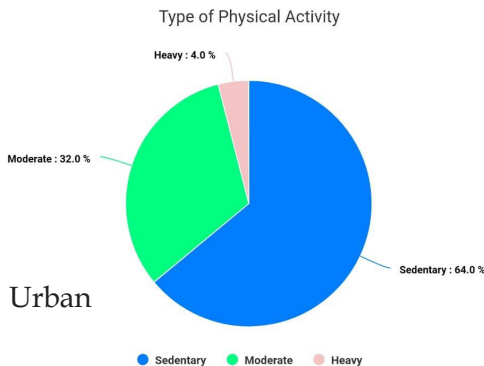
Urban

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"Evaluation of Polycystic Ovarian Disease among Adolescent and Women"

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Abstract

Polycystic ovarian syndrome (PCOS) is a heterogeneous endocrine disorder affecting 5-10% of women in reproductive age. A cross-sectional study was conducted among 55 adolescent girls and women aged 13-45 years in Kerala, India to assess the prevalence of PCOS. Clinical symptoms, anthropometric measurements, socioeconomic factors, and dietary habits were evaluated using questionnaires. 27% (n=15) of participants showed symptoms suggestive of PCOS, including menstrual irregularities, hirsutism, hormonal disturbances and obesity. High BMI was observed in 34.5% of subjects. Despite education, majority of women were unaware of PCOS risks. An educational intervention emphasized the role of lifestyle modification and balanced diet in managing PCOS.

Introduction

Polycystic ovarian syndrome (PCOS) is characterized by hyperandrogenism, ovulatory dysfunction, and polycystic ovarian morphology due to intricate interplay of genetic, metabolic, and environmental factors (Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group, 2004). The prevalence of PCOS varies between 5-10% in women of reproductive age depending on diagnostic criteria (Lizneva et al., 2016). PCOS has profound reproductive, metabolic and psychological implications including infertility, diabetes, cardiovascular risks and mood disorders (Ibanez et al., 2017). Adolescent girls with PCOS are at higher risk of developing long-term comorbidities (El Hayek et al., 2016). This cross-sectional study aimed to determine the prevalence of PCOS among adolescent girls and women in a sub-urban area of Kerala, India using questionnaires on clinical symptoms, anthropometry and patient history. An educational intervention was also conducted to spread awareness regarding utility of lifestyle changes in managing PCOS.

Objectives

- Identify adolescent girls and women at risk of PCOS using clinical features like oligomenorrhoea, hirsutism, obesity etc.
- Evaluate anthropometric measurements like BMI and waist-hip ratio
- Analyse socioeconomic factors, dietary habits and patient history
- Create awareness about healthy lifestyles through health education

Materials and Methods

- Cross-sectional questionnaire-based survey among 55 participants (14 adolescents and 41 women) aged 13-45 years in sub-urban Kerala
- Clinical symptoms assessed: menstrual irregularities, hirsutism, acne, weight gain, infertility
- Anthropometric indices evaluated: BMI, waist-hip ratio
- Socioeconomic factors: income, education, occupation, marital status
- Dietary habits evaluated using food frequency questionnaire
- Medical history: age of menarche, menstrual flow, family history etc.
- Health education intervention conducted on lifestyle modification
- Data analysis done using suitable statistical methods

Results

A cross-sectional study was conducted among 55 participants to evaluate polycystic ovarian disease (PCOD) among adolescents and women. The sample consisted of 25% adolescents (13-19 years) and 75% women (20-45 years).

The socio-demographic profile showed that majority were married (72%), lived in nuclear families (80%), and belonged to lower socioeconomic status (64%). Most were daily wage laborers (65.4%) and the education levels included 37% primary, 27% secondary, and 33% above secondary education.

Out of 15 women screened, 42.5% (n=9) had symptoms of PCOD while 57.5% (n=6) did not have PCOD. Regarding menstrual history, 83.5% reported normal periods of 1 week duration while 14.3% reported irregular periods of more than 1 week. Overall, 74.6% had regular cycles and 25.4% had irregular cycles.

Clinical features wise, obesity was present in 17.3%, hirsutism in 18.4%, skin pigmentation in 15.7%, irregular periods in 13.7%, other symptoms in 3.9%, and no symptoms in 31%. For anthropometry, 34.5% were overweight, 52.2% normal weight, and 12.6% underweight. Pear body shape was observed in 29%.

In terms of awareness and treatment, 89.1% were aware about PCOD while none reported using oral contraceptives. Additionally, 29% reported hormonal disturbances.

Discussion:

The study provides insights into PCOD prevalence, clinical features, and awareness among adolescents and women. The PCOD prevalence of 42.5% highlights it as a condition affecting women in their reproductive years. Irregular periods, hirsutism and obesity were the most common symptoms while a third did not have any symptoms, indicating variable manifestations. Though awareness was high, specific treatment use was low indicating a gap between knowledge and practice. Overall, the findings substantiate PCOD as a concern impacting menstrual health and endocrine function among young women. Targeted education and lifestyle management should be promoted to improve outcomes.Table 1: Information on menstruation

Table 1: Information Regarding Menstruation of Sample

VARIABLES	CATEGORY	FREQUENCY	PERCENTAGE
Age of onset of menarche	≤14	36	65.4%
	>14	19	34.5%
Duration of mensuration	≤7 days	47	85.4%
	≥7 days	8	14.5%
Had mensuration currently	Regular	41	74.5%
	Irregular	14	25.4%
Taking oval contraceptive pills	No	-	-
Pear body shape	Yes	16	29%
	No	39	70.9%
Hormonal change	Yes	16	29%
	No	39	70.9%

Figure 1: Duration of Menstruation

Figure 2: Regularity of Menstruation
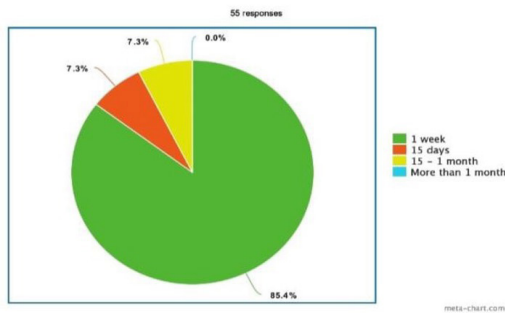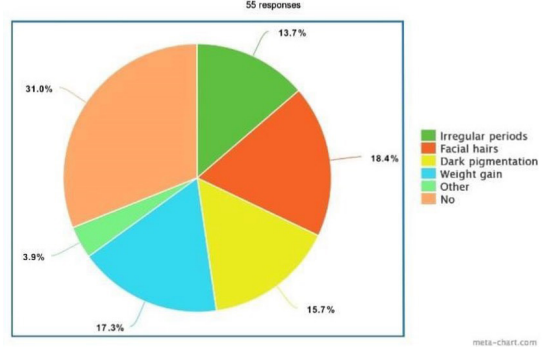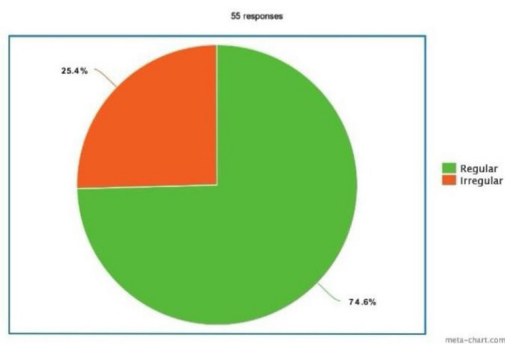

Figure 3: Common Symptoms

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"Comparison of Nutritional Status of Geriatric Population among Rural and Urban Communities"

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Abstract:

This descriptive cross-sectional survey was conducted in selected areas of Ernakulam involved 60 geriatric participants over 10days) May12 th to May21 st .(Urban geriatric individuals exhibited better health, with a majority following healthier dietary patterns and engaging in physical activities, contrasting with rural counterparts facing common disorders .The study indicates a correlation between urban geriatrics 'health and their educational and economic status. Adequate nutrition ,proper diet ,sunlight exposure ,and light physical activity contribute to reducing old-age risks.

Introduction

Geriatric Nutrition is vital for overall health ,especially among community-dwelling older adults facing risks like social isolation and frailty .Despite extensive literature on older adults' dietary needs ,it's unclear how nutritional recommendations are provided to home health recipients. To address this gap ,we reviewed literature on nutritional education and assessment for older adults at home.

In developing countries ,multi-morbidity is common in the geriatric population ,constituting 8.6% of India's total population .With a majority residing in rural areas ,older adults, especially those aged 60 and above ,face a higher risk of poor nutritional status. This risk is associated with inadequate or excessive nutrient intake ,influenced by diet patterns and physical activity, impacting geriatric syndromes.

Objectives of the study

- To evaluate socio-economic ,dietary, lifestyle and ethical influence on nutritional status of Geriatric people in Rural and Urban Communities.

- To assess and compare the nutritional status of Geriatric people among different communities.

- To observe the present health problems among Geriatric people.

- To estimate the prevalence of nutrition related diseases among Geriatric people.

Hypothesis of the Study

There is significant difference in the Nutritional Status of Geriatric populations of Urban and Rural Regions.

There is significant difference in Health status among the two Communities.

Materials and Methods

This descriptive cross-sectional survey was conducted in Ernakulam district, Kerala from May 12-21, 2022 to assess health status of older adults aged 60 years and above. The study setting included urban areas like Kacheripady, North Ernakulam and rural areas like Choornikkara. Ernakulam was chosen for its metropolitan nature and rural/urban areas were selected to capture lifestyle differences. Individuals in mental health facilities, rehabilitation centers or palliative care were excluded.

A sample of 60 older adults, 30 each from urban and rural areas, was selected through random sampling to ensure unbiased representation. Data was collected via standardized offline questionnaires, with discrepancies resolved through discussion. Descriptive analysis was done using frequencies, percentages and means calculated from Google Forms. Graphs were created for visualization.

For BMI, mean values were pooled. For dietary habits and activity levels, data was pooled to find means. The study identified cognitive training, physical exercises and multicomponent interventions as effective in improving activities of daily living in the elderly. The methodology involved a robust sampling approach, validated data collection tools and appropriate statistical analysis to derive evidence-based insights into the health status of the geriatric population.

Results and Discussion:

The study included comparison of Nutritional Status of Urban and Rural Geriatric Residents. The education levels differed between the urban and rural older adult populations surveyed. In the urban area, out of 30 respondents, 67% were graduates, 20% had completed high school, and 13% were below high school level. This shows that most urban older adults were highly educated. In contrast, in the rural area, out of 30 respondents, 27% were graduates, 20% had finished high school, while 53% were below high school level. This indicates lower education levels among the rural elderly.

The dietary habits varied considerably between the urban and rural elderly. Urban Geriatric Residents consumed more eggs, fruits, vegetables, nuts and milk on a regular daily basis. Rural Geriatric Residents consumed these food items irregularly and inadequately. Consumption of rice, wheat and fish was regular in both groups. However, urban older adults avoided fast food more than their rural counterparts.

Urban Geriatric Residents indulged in some form of physical activity daily as part of their routine. However, rural elderly did not participate in any kind of physical exercise on a daily basis.

Moreover, they followed a low-carbohydrate, high-fat and high-fiber diet overall. In contrast, the rural elderly had a high-carbohydrate, high-fat and high-fiber dietary pattern.

The weight status also showed divergence between the two groups. In the urban area, 88% had normal BMI, 10% were overweight, and 2% underweight. In the rural area, only 42% had normal BMI, 53% were overweight, and 5% underweight.

In summary, key lifestyle factors like education, diet, activity levels and weight status were substantially different between the urban and rural geriatric populations. Urban older adults

displayed better health literacy, dietary habits and physical activity levels compared to rural elderly.

Conclusion

The study provide an analyis of the nutritional status of Geriatric people of Rural and Urban Communities. House to house visits were made and all the elderly above the age of 60 years were studied. Thus, a total of 30 elderly were interviewed with the help of predesigned and pretested schedule in rural and urban regions each. Information on demographic profile, socioeconomic status, living status and number of major meals were included in the schedule.

We further correlated the health status with nutritional status among the elderly. Our study found that increased risk of undernutrition in older adults is associated with multiple medications, comorbidity and dysphagia. This is consistent with the findings of previous studies, where inadequate health condition, comorbidity and multiple medications are reported as contributing factors for malnutrition in older adults. In addition, dysphagia is also considered a crucial risk factor for malnutrition in the aged populations.

The results from the present study revealed that nutritional status urban people are healthier and follow a healthy nutritious lifestyle whereas rural people are careless and lack a healthy lifestyle. Thus, rural people have a less healthy nutritional status. Rural people also have higher prevalence of morbidity related to old age.

This study was delimited to investigation of prevalence, causes as well as health, social, and academic implications of nutritional status among geriatric people, aged 60+, from Ernakulam district. This study may lack relevance to represent some country-patterns, because there are many social classes and geographical locations that were not represented. However, for a centralised education system and life patterns, results may be feasible for generalisation.

In conclusion, we were able to follow our opted objectives in the study and the nutritional status of urban and rural residents differ greatly. Socio-economic status, education, food resources, health checkups are the chief reasons for the above. The nutritional status of geriatric people are evidently higher in urban region than in rural region

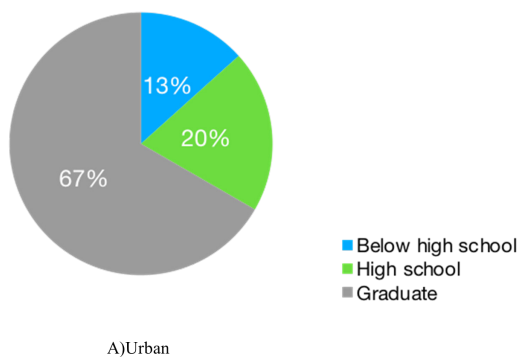Figure 1: Education Qualification in Urban and Rural Regions

A)Urban

Table 1: Food frequency of Rural and Urban Geriatric Residensts
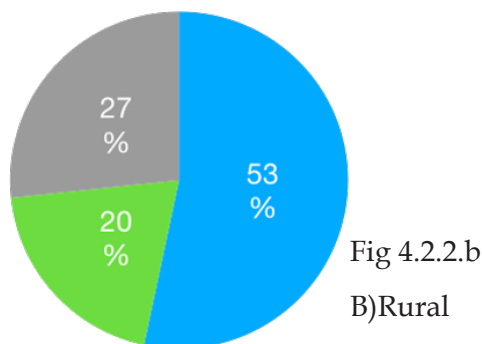
Unit 1=1person

Fig 4.2.2.b

B)Rural

	Never		Once a week		2-6 times a week		Daily	
	Rural	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**
Milk	0	2	0	0	5	5	25	23
Eggs	2	2	1	0	12	6	15	22
Rice	0	1	0	0	0	0	30	29
Wheat	0	0	0	0	0	17	30	13
Pulses	0	0	0	2	15	15	15	13
Vegetables	0	0	7	0	12	0	11	30
Fruits	0	0	17	0	3	0	10	30
Nuts	13	5	2	0	6	3	9	22
Sugar	5	9	0	0	2	10	23	11
Fast food	1	18	2	2	26	5	1	5
Meat	9	9	2	2	7	7	12	12
Fish	9	9	2	2	7	7	12	12

Table 2:Nutritional Status Comparison of Geriatric Residents in Urban and Rural Region.

Classification	Range	Percentage (%)	
		Urban	Rural
Underweight	<25	1.06%	3.7%
Normal	25-27	88.76%	42.8%
Overweight	>27	10.18%	53.5%

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Review on Applications of Pmma as Composite with Various Fillers

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Abstract

Polymethylmethacrylate (PMMA) is one of the important transparent commercial plastics, having unique properties often used as a light or shatter – resistant alternative to glass. Advances in the use of polymethyl methacrylate (PMMA) have opened up a wide range of applications in the field of composites. The knowledge of the properties of PMMA has contributed a lot to the recent boosts in the synthesis ,modification,applications of composites containing various fillers.This review highlights the applications of PMMA in the medical field as a denture base material,in the preparation of nanocomposites using various compatibilizers ,in the preparation of biocomposites and how much PMMA based composite with fillers are adequate in its dispersion and their advantages and also the applications of PMMA in various fields.

Key words : PMMA,Composites,fillers

1. Introduction

Composites are one of the most widely used materials because of their adaptability to different situations and the relative ease of combinations with other materials to serve specific purposes and exhibit desirable properties.Since composites possess different advantages such as weight reduction-high strength or stiffness to weight ratio, Longer life Lower manufacturing cost , Corrosion resistance, Dimensional stability .One of the important consideration in the use of composites is light weight .

Polymethylmethacrylate (PMMA) is one of the important transparent commercial plastics, often used as a light or shatter –resistant alternative to glass. It is sometimes called acrylic glass. Chemically, it is the synthetic polymer of methyl methacrylate. The glass transition temperature of PMMA ranges from 85 to 1650 C. Polymethyl methacrylate (PMMA), a synthetic resin produced from the polymerisation of methyl methacrylate. A transparent and rigid plastic, PMMA is often used as a substitute for glass in products such as shatterproof windows, skylights, illuminated signs, and aircraft canopies. It is sold under the trademarks Plexiglas, lucite, and Perspex. PMMA, an ester of methacrylic acid ($CH_2=C[CH_3]CO_2H$), belongs to the important acrylic family of resins. In modern production it is obtained principally from propylene, refined from the lighter fractions of crude oil. Propylene and benzene are reacted together to form cumene, or isopropylbenzene; the cumene is

oxidized to cumene hydroperoxide, which is treated with acid to form acetone; the acetone is in turn converted in a three-step process to methyl methacrylate (CH2=C[CH3] CO2CH3), a flammable liquid. Methyl methacrylate, in bulk liquid form or suspended as fine droplets in water, is polymerized (its molecules linked together in large numbers) under the influence of free-radical initiators to form solidPMMA. The structure of the polymer repeating unit is:.

$$+CH_2-\underset{\underset{CO_2CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}+$$
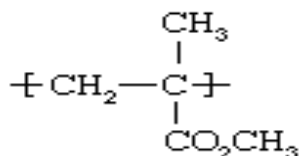
Nowadays , the importance of PMMA and PMMA based composites increases day by day due to their enhanced and unique properties. Since 1930 PMMA is the most commonly used polymeric material in the fabrication of the denture base materials, because of their special characteristics allow it a wide range of medical applications which are not available in other types of materials[1]. From the chemistry point of view, elements, compounds, molecules, and polymers possess some qualities that prove their existence as entities to scientists or analysts.   However, the qualities possessed by these substances can be altered, modified, or permanently changed to another form, with the intention of producing a new substance with new qualities. This can only be achieved through the interactions of the substance with another substance

of the same or different type. In this review, we adequately condensed the superior performance acquired by PMMA while adding different types of fillers.The synergistic effect of applying multiple fillers within the same polymer matrix is one of the most important advancements in material science, where more benefits can be obtained than using the individual fillers and at the same time the dispersion of fillers into the polymer matrix is a crucial parameter to get proper reinforcement of the composites. This paper reviews how much PMMA based nanocomposite with fillers are adequate in its dispersion and advantages and also the applications of PMMA in various fields.

2.Applications

2.1 PMMA as a denture base material

Although a recent study by Sihama Issa Salih et .al the effect of adding different types of natural powders (pomegranate peels and seed powder of dates Ajwa) on the flexural properties, as well as, the impact strength and fracture toughness values for a self polymerized PMMA   which used for a denture base application. Two groups of PMMA nanocomposites samples were fabricated by hand lay-up method at laboratory temperature used for manufacturing of the maxillary complete or partial denture base. These samples consist of poly methyl methacrylate (PMMA) resin as a matrix material, was strengthen by   two different natural powder in nanometre size (pomegranate peels (PPP) and seed powder of dates Ajwa (SPDA)) in individually form, with selected weight

fraction ratio (0, 0.4, 0.8, 1.2 & 1.6 wt. %).Some mechanical properties and analytical physical properties (FT-IR, SEM) were investigated. From FT-IR Studies, full characterization of PMMA and nano composites specimens as a function of additional nature powders in nanometre size which are added in individually form to PMMA material. The FT-IR spectrum of pomegranate peel powder (PPP)confirmed the complex nature of the peels and proved the presence of a wide variety of compounds. It has been reported by studies that pomegranate peels contain different natural compounds with biological nature. From the infrared spectrum of PMMA ,which was reinforced with different ratio of nano-pomegranate peel powder (PMMA: x% nano-pomegranate peels) as a first group of nanocomposite materials , All the characteristics vibration bands of neat PMMA were presented in FT-IR spectrum of the first group composites specimens. In addition, it can be observed that, from the infrared spectrum for the first group composite specimens , there is no new peak, or peak shifts in the spectrum of PMMA composite specimens, this is due to physical bond and absence of any cross linking in these specimens. There is a clear increase in peak intensity for all of characteristic peak with increasing Nano- pomegranate peels ratio in the composite and it reaches to maximum at 4% of nano powder of pomegranate peels, except at a ratio of 1% of the peel's powders, it was observed a decreased in peaks intensity was occur.

The infrared spectrum of neat PMMA and second group composites specimens (PMMA: x% Seeds powder of dates Ajwa), which was reinforced with a different ratio of Nano- Seeds powder of dates Ajwa (SPDA). All the characteristic vibration bands of a neat PMMA spectrum were present in (FT-IR) spectrum for the second group of composites specimens. In addition, from this spectrum there are no other new peaks or peak shifts observed for the PMMA nano composite specimens, this is due to finding physical bonds and absence of any cross linking in these specimens. There is a clear decrease in peak intensity for all of the characteristic peaks with increasing seed powder of a dates Ajwa ratio and it reaches to minimums at 0.8% Nano-powder. Then peak intensity was increased with increased Nano powder ratio to 1.2%.

The effect of the addition two types of natural fillers (pomegranate peels powder (PPP) or Seeds powder of a dates Ajwa (SPDA)) in individually form as a reinforcement particle to PMMA on the flexural strength, flexural modulus and maximum shear stress of PMMA nanocomposites. The values of flexural strength, flexural modulus and maximum shear stress for neat PMMA specimens. were equal to 78 MPa, 3.4042 GPa and 2.531 MPa respectively. When the PMMA specimen was reinforced with PPP or SPDA, it's found there is a considerable improvement in the values of these properties and for both groups of bio composite specimens compared with neat PMMA.

The addition of the pomegranate peels and dates seeds individually, as particle reinforcing causes improvement in the impact strength and fracture toughness

values of the PMMA bio composites. The reason behind this behavior may depend on the impact test is a measure of a given material's toughness. So, the obtained results may be concerned with typical distribution of natural particles within the PMMA matrix and interfacial bonding between them leads to considerable increase in the energy absorbing capacity of the bio composite specimens .

Several lines of evidence suggest that the addition of natural fillings nanoparticles (pomegranate peels powder and seed powder of dates ajwa) to bio PMMA material, is one of the promising materials in use to improve the strength of fracture to the base of dental kits[2].

Nada N. Kadhim et.al investigated the effect of pistachio shell powder on some properties of PMMA acrylic resin that's popularly used as a denture base where this natural power had been added in different weight fraction and different average particle size. The dental restorative material by using natural power as reinforcing material, and trying to evaluate whether the natural powder can enhance the strength and modulus of denture base resins. Polymeric materials represent important material in the dentistry field because their special characteristics allow it a wide range of medical applications which are not available in other types of materials, today and since 1930 PMMA is the most commonly used polymeric material in the fabrication of the denture base materials. Although its advantages are the simplicity of molding and repairing, inexpensive

if compared with metal-base denture and excellent aesthetic appearance, but the main drawbacks of PMMA are presented in its poor mechanical properties, especially the low toughness . Therefore in this research, the paper had been studied the Tensile strength and SEM to evaluate the mean value and show the significant difference for each particle size, The results were as the following; while the young's modulus had been increased with increased The weight fraction of pistachio shell powder and reach its maximum value at of average size .From the results it is clearly understood that the tensile strength, elongation percentage were decreased with increasing the weight fraction of Pistachio Shell powder in PMMA resin and the lowest values of them were obtained at (12wt.%) and at average particle size of (212µm) . The modulus of elasticity will be increased with increasing the weight fraction of Pistachio Shell powder in PMMA resin, and the highest value was obtained at (12%wt.) at average particle size of (53µm) and the morphological test results showed a brittle to semi ductile transformation, where the smoothness of the composite specimens will increase when the PMMA reinforcing with Pistachio Shell powder.There is a remarkable difference in the behavior of the fracture surface morphology of neat PMMA compared with the PMMA composite reinforced with Pistachio Shell powder of different average particle size, where the the dispersion of Pistachio Shell particles is relatively good and the particles embedded in the matrix and became part of it, so there is a uniform dispersion through the entire

PMMA matrix that is resulting from the strong interfacial and interaction between the PMMA matrix and Pistachio Shell powder in the composite specimens,[3]

2.2 PMMA as a matrix which enhances thermal stability

It has been recognised that Thangamani Rajkumar et. al investigated the thermal properties of PMMA-Maleimide Functionalized reduced graphene oxide nanocomposites.Reduced graphene oxide (RGEO) and N-[4-(chlorocarbonyl)phenyl]maleimide functionalized reduced graphene oxide (MFR GEO) were used as nanofillers for polymethyl methacrylate (PMMA) matrix nanocomposites to enhance thermal stability. Methyl methacrylate containing nanofiller of four different weight percent (0.2, 0.4, 0.6, and 0.8) was polymerized using ultrasonic radiation-assisted bulk polymerization. The FT-IR study of PMMA and nanofiller-loaded PMMA revealed no variation in the spectral band positions and thus showed the absence of chemical interaction between the filler and the matrix phase. Morphology of nanocomposites studied using a scanning electron microscope confirmed the assistance aided by ultrasonication in the uniform dispersion of nanofiller in the PMMA matrix. It was observed that the PMMA polymer matrix produced a bright contrast, whereas the nanoparticles produced a dark contrast. On comparing the SEM images, one can find the uniform dispersion of nanoparticles in the PMMA matrix. The absence of bigger aggregation confirms the assistance aided by ultrasonication

and maleimide functionalization on RGEO in the uniform dispersion of nanofillers RGEO and MFRGEO in the PMMA matrix. Thermogravimetric (TG) study revealed the presence of MFRGEO enhanced the thermal stability of PMMA by shifting the entire degradation to higher temperature. The thermal stability of PMMA nanocomposite was improved by as much as 40 degree celsius at just 0.8 wt% loading of MFRGEO. Differential TG study also supported the role of maleimide functionalization on RGEO in the enhancement of thermal stability of PMMA by means of retarding the degradation rate of unsaturated chain ends in the PMMA matrix. Unlike MFR GEO, RGEO failed to enhance the thermal stability of PMMA. The TG study indicates that PMMA-MFRGEO nanocomposites are having better thermal stability than PMMA-RGEO nanocomposites and neat PMMA. Several lines of evidence suggest that enhanced thermal stability of PMMA-MFRGEO is attributed to uniform distribution of nanofiller which could dissipate heat uniformly, polymerization of maleimide unit attached to the graphitic plane, and hindrance to depolymerization at unsaturated chain ends[4].

ManishKumaret.al reported an enthusiastic work in the preparation of poly (Methyl Methacrylate,PMMA) nanocomposites using various compatibilizers like polypropylene-grafted maleic anhydride (PP-g-MA), polyethylene-grafted maleic anhydride (PE-g-MA) and polystyrene-block-poly(ethyleneran-butylene)-block-polystyrene-graft-maleic anhydride

(PS-g-MA) .The various PMMA nanocomposites were prepared by melt intercalation method using twin screw extruder followed by injection molding to make specimens for mechanical testing. The mechanical, thermal and morphological properties of nanocomposites were evaluated by tensile test, impact, hardness, thermogravimetric analysis (TGA), differential scanning calorimetry (DSC), X-ray diffraction (XRD) and transmission electron microscopy (TEM). The intercalated structure of the PMMA nanocomposites is validated by XRD and TEM analysis. The results are found to be good agreement with each other. The TGA data demonstrate that PMMA nanocomposites exhibit enhanced thermal stability of 22-36 °C with respect to pure PMMA, at 50% weight loss is considered as point of reference. The PMMA nanocomposite prepared with PS-g-MA compatibilizer promotes adequate interface adhesion between the nanoclay and polymer matrix. As a result, PMMA-5-PS sample displays improved mechanical properties over PMMA-5-PP and PMMA-5-PE samples. The maximum improvement of tensile strength, Young's modulus and hardness for the PMMA-5-PS nanocomposites over PMMA-5-PE is estimated to be 8, 2 and 26 %, respectively[4].

2.3 PMMAas a matrix which enhances biodegradability

Ahmeth ulu et.al investigated PMMA activated hydroxyl groups that can also easily interact with L-ASNase due to hydrophilic character. PMMA starch composites as an enzyme immobilization matrix in order to improve L-ASNase half-life and enzymatic stability.Even though PMMA has low biodegradability as enzyme immobilization matrix, the biodegradability of PMMA can also be enhanced by incorporating of the natural and easily degradable molecules into the polymer structure. Starch as easily degradable molecule is one

of the promising materials for the production of biodegradable plastics. In this study, to increase the biodegradability of the PMMA, different ratios of starch were used. The biodegradation of PMMA-starch composites was compared with pure PMMA in a study for 1 month during 7th, 14th, and 28thdays.From the results it was found that the percentage of weight loss in composites were increased with the ratio of starch compared with pure PMMA and also Biodegradability of the composite is related to the amount of starch and interactions between PMMA and starch. PMMA-S-3% and PMMA-S-5% have the same or low biodegradability compared with PMMA-S-1%. It can be explained with strong interactions between the PMMA and starch. It is formed more compactly with a stacked polymer chain structure. The good interaction between starch and the polymer affects chemical and thermal stability and biodegradability of this stacked structure decreases. From this research, we get a clear idea about another important effect in biodegradability properties of the composites was the most hydrophilic character in high starch concentration. Especially, in PMMA-S-10%, the incorporating of the starch caused

the high increase in the hydrophilic character of PMMA starch. Therefore, this composite has more hydrolytic biodegradability compared with other PMMA–starch composites.

FT-IR studies were conducted and It was clear that all of the composites were the same peak. Through the FT-IR analysis of pure PMMA and PMMA-starch composites, they successfully synthesized a series of PMMA-starch composites and GPC analysis of pure PMMA, they deduce that pure PMMA with a unimodal molecular weight distribution and a low polydispersity index was obtained. In this research they investigated the influence of L

ASNase incorporated into the PMMA/starch composites on the morphology, PMMA and PMMA-S-3%-L-ASNase were examined by SEM. It has been reported that the morphology of PMMA-S-3%-L-ASNase is found to be very fragmental in shape and from EDX analysis they confirmed that L-ASNase was successfully incorporated into PMMA starch composites structure . From this DSC curves of pure PMMA and PMMA–starch composites, the glass transition temperature (Tg) for the pure PMMA was found to be 110 degree celsius .Tg values of PMMA-S-1%, PMMA-S-3%, PMMA-S-5%, and PMMA-S-10% were determined as 119, 122, 130, and 147.8 degree Celsius, respectively. The increase of Tg values caused high interaction between chains and obtained rigid structure depending on the amount of starch.

From this research it is clearly understood that, L-ASNase was successfully immobilized onto biodegradable and biocompatible PMMA-starch composites and the

hydroxyl groups of starch provide interaction between L-ASNase and PMMA-starch composites and hence PMMA-starch-LASNase showed high activity than PMMA-L-ASNase and also PMMA starch composites were found to have better thermal stability and more hydrophilic character than pure PMMA. The affinity of the immobilized L-ASNase increased considerably compared with that of native enzymes in terms of the thermal, pH and storage stabilities. The immobilization process advanced the L-ASNase thermal stability above 60 0C and pH activity range from pH 8.5 to pH 10.0. The Km values were 0.216 and 0.026 mM for native and immobilized enzymes, respectively. The affinity of L-ASNase with its substrate L-asparagine increased considerably when modified with the PMMA-S-3%. As a result of, PMMA-starch composite prepared by in situ doping of starch to PMMA can be provided more advantageous in term of enzymatic affinity, thermal, pH and storage stability for L-ASNase immobilization.[5]

2.4 PMMA as a matrix with bioactivity

Poliana Lopes et.al studied the bioactive glass of the 3CaO-P2O5–MgO–SiO2 system and incorporated as a filler into poly methyl methacrylate-co-ethylhexyl acrylate (PMMA-co EHA) copolymer. The effect of filler proportion (0, 30, 40 and 50 wt.%) on the bending properties was evaluated.The study was to prepare materials with the desired

mechanical properties and in vitro bioactivity. Composites with different amounts of glass were produced and the effect of composition on the bending property and apatite forming ability was evaluated. The composites were prepared by mixing the solid,(Benzoyl peroxide(BPO), Glass (VH1) and polymethylmethacrylate(PMMA) and liquid ,(Methyl Methacrylate(MMA),Ethylhexyl Acrylate (EHA)and N,N-dimethyl-ptoluidine(DMPT) components, employing a solid/liquid ratio.

The various composites were tested by bending. Six or seven samples were tested for each composition. Through this the mechanical properties were observed. Fracture surfaces of test

specimens were examined by scanning electron microscopy(SEM) in order to identify the nature of the fracture and any difference between the compositions. Also X-ray diffraction(XRD) studies were conducted. The mechanical values for all composites were slightly higher than those reported for cancellous bone. From this investigation,we get a clear idea about proportion of filler,that is for materials containing proportions of filler higher than 30 wt.%, the strength decreased steadily with increasing glass content, thus attaining similar values to those of the matrix material for 50 wt.% filler and also the Porosity was reduced with increasing amount of particulate filler. From the Previous studies it is reported that poor interface adhesion between the constituents of composites can be responsible for their decreased mechanical properties . From this paper , it is evident that the reason for

this problem is due to inhomogeneous distribution and agglomeration. When the filler begins to aggregate, it behaves like voids in the cement, thereby weakening it; therefore the strength is reduced even if the filler is strong enough to increase the elastic modulus of the material .

The experiment results that, the addition of 30 wt.% of 8.7 lm (mean particle size) glass powder particles to a PMMA-co-EHA matrix resulted in significant increases in flexural strength and elastic modulus, increasing the mechanical performance of the material to the upper level of the values reported for cancellous bone[6].

2.5 PMMA for biocomposite preparation

Mei-Chun Li et. al investigated mechanical performance ,water absorption behavior and biodegradability of poly methyl methacrylate by using modified starch/styrene-butadiene rubber SBR biocomposites.the emulsion modification and latex compounding method was used to prepare high performancing modified starch/SBR biocomposites and investigated the effect of MMA and starch concentration on the various properties, such as mechanical performance, morphology, toluene swelling behavior, water absorption behavior and biodegradability of PMMA-modified starch/SBR biocomposites.

From the results it is clearly understood that the remarkable improvement in tensile strength was observed by the addition of modified starch. The
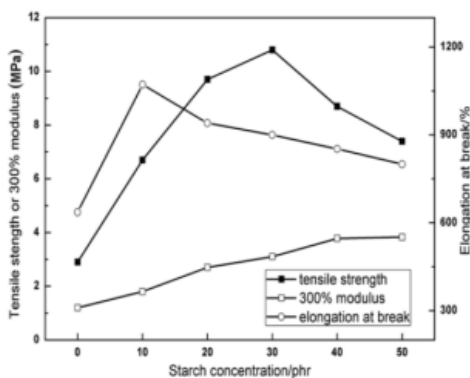
Figure 1[7]. Mechanical properties of PMMA-modified starch/SBR biocomposites: effect of starch concentration.

optimum mechanical properties were achieved when the concentration of MMA and starch were 10 and 30 phr respectively. The effect of starch concentration on the mechanical performances of PMMA-modified starch/SBR biocomposites are shown in figure-1 [7]

The paper also investigated the effect of starch concentration on the crosslinking density, water absorption ratio and biodegradability of PMMA-modified starch/SBR biocomposites. The high moisture absorption of starch deteriorates the fixing with polymeric matrix and then lead to premature ageing by decomposition and loss of strength. Therefore, it is very essential to investigate the water absorption properties of PMMA modified starch / SBR biocomposites. It has been reported that the water absorption was strongly dependent on various factors, such as immersion time, filler concentration, interracial adhesion and the number of voids formed in the interfacial area. The biodegradability of PMMA-modified starch /SBR biocomposites

was investigated by soil burial test for 3 months. When the biocomposites were buried in the soil, microorganisms preferably attacked the specimens which had higher moisture contents and lower crosslinking density, resulting in higher weight loss. The surface morphologies of biocomposites are shown in figure-2 [8].A large number of perforations were observed on the surface of biocomposites after soil burial treatment due to removal of starch particles by microorganisms.
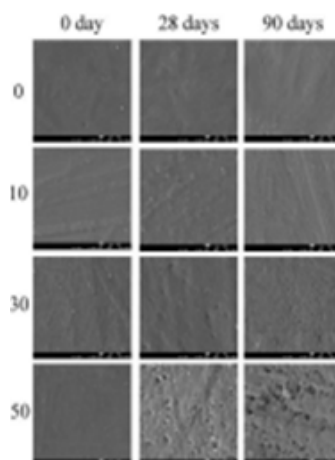

Figure 2 [8] Surface morphology of PMMA-modified starch/ SBRbiocomposites: before and after soil burial.

The results indicated that when the starch concentration was less than 30 phr, the biocomposites exhibited high crosslinking density, relative low water absorption ratio and low biodegradability. Further incorporation of starch (40 or 50 phr) easily formed agglomerates and therefore decreased the crosslinking density of biocomposites, while dramatically increased the water absorption ratio and biodegradability of biocomposites. [9]

3.CONCLUSION

In this review, we adequately condensed that the PMMA is widely used as a vital component for preparing several composites. With reference to the papers studied it was found that PMMA was the foundation for preparing several composites such as modified starch/SBR ,maleimide functionalized reduced graphene oxide,etc.The numerous advantages of polymethyl methacrylate (PMMA) make it the most dominant polymer used as a denture base material.The ease of processing,low cost,lightweight,stability in oil cavity,aesthetic properties are some of the advantages.Among grafting polymers PMMA has been extensively used for surface modification of various organic or inorganic fillers,since PMMA is non toxic and very cheap.Additionally PMMA nanocomposites with different compatibilizer have been successfully prepared because of their adequate dispersion .Due to its extensive features PMMA is also used for biomedical applications. Finally this paper reveals that PMMA is an inevitable material in our contemporary society with its wide uses.

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