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PREVALENCE OF OBESITY AND ITS LINK BETWEEN VARIOUS DISORDERS IN A SEMI URBAN DISTRICT IN KERALA

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ABSTRACT: Overweight and obesity rates have been increasing sharply over recent decades in all industrialized countries, as well as in many lower income countries. According to the WHO World health statistics report 2012, globally one in six adults is obese and nearly 2.8 million individuals die each year due to overweight or obesity ¹. Obesity is a close marker of important aspects of individual life styles, such as diet and physical activity, and is also an important risk factor for major chronic diseases, such as diabetes, heart disease, stroke and certain type of cancer. Obesity is also associated with negative labour market outcomes, in terms of both wages and employment, particularly for women ². Several studies show that education has a positive impact on health and well-being ³. This is a prospective observational study, conducted with 750 patients in Kerala. The study conducted strictly observed the prevalence of obesity in a particular area of kerala, risk factors, concomitant disorders and awareness of patients about obesity and related illness in detailed and elaborate manner. Majority of patients were not aware about the seriousness and health hazards of obesity. Family history has a strong impact on the incidence of obesity. The major concomitant disorder was hypertension and cardiovascular disorder. Good proportion of the patients were started the initiatives on weight loss, but majority of the efforts were lasts within 6 months, as a result the major outcome of the weight loss initiatives was failure, and the reason for the failure was mainly due to the loss of will after the starting of weight loss initiatives.

INTRODUCTION: Overweight and obesity rates have been increasing sharply over recent decades globally. According to world health organisation more than 1 billion adults are overweight with at least 300 million of them are obese. WHO also estimates that 1.5 billion adults and about 43million children under 5 years old were overweight in 2010.

The circumstances in which people have been leading their lives over the past 20-30 years, including physical, social and economic environments, have exerted powerful influences on their overall calorie intake, on the composition of their diets and on the frequency and intensity of physical activity at work, at home and during leisure time. Individual with obesity have higher rates of mortality and morbidity compared to non obese individuals ^{4,5}.

The rising numbers affected by obesity reflects profound changes in societies over recent decades. Economic growth, modernisation, urbanisation, nutrient modification and globalisation of food

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markets are just some of the forces driving a worldwide energy balance. A study conducted in four regions (Chandigarh, Tamilnadu, Maharashtra and Jharkhand) showed the highest prevalence of obesity in Chandigarh and it has the highest per capita income among all four regions studied and is highly urbanized⁶.

For children, between 5-7 years the regional prevalence data on overweight and obesity are currently unavailable⁷. However, data for overweight and obesity prevalence among children in different countries in south Asia are available: 25.0% among children from 2-15 years in Bangladesh and 22.0% among children from 5-19 years in India. Moreover, secular trends indicate increasing prevalence rates in these countries: for example, 9.8 to 11.7% among children from 5-19 years in India during 2006-2009^{8,9}.

Obesity is a condition of abnormal or excess fat accumulation in adipose tissue, which may adversely affect health of body and increase health problems. Although the mechanism of obesity development is not fully understood, it is confirmed that obesity occurs when energy intake exceeds energy expenditure¹⁰. The normal growth of adipose tissue taken account of several phases, during first years (early infancy) of the first period, adiposity increases and it reduces in next year and remains stable for several years. Adiposity rebound start around 6 years during second period, from this stage, both size and number of adipocytes increases¹¹. According to various studies the current prevalence of childhood overweight in India could range from 4% to 22%^{12,13}.

Studies have also pointed towards potential connections between childhood overweight and psychological characteristics (eg: Depression, Anxiety and social withdrawal)^{14, 15}. Previous research has indicated the presence of neglect, stigma, bias, and discrimination against overweight or obese children, which can culminate into pervasive victimization, teasing, and bullying^{16, 17}. Reports of depression, anxiety and social thoughts have also been associated with abnormal weight in adolescent in western countries¹⁸.

In a study conducted amongst middle aged women in four urban and five rural locations in northern (Hariyana), central (Jaipur), western (Pune) eastern (Kolkata) and southern (Kochi, Gandhigram) regions of India. Age adjusted prevalence of obesity in urban vs. rural was reported to be 45.6 vs. 22.5 percent and abdominal obesity to be 44.3 vs. 13.0 percent respectively¹⁹. The exact link between education and health is not clear, however it may be due to the changes in life style, like education is awareness and awareness is health consciousness.

The risk for someone with a BMI of 30 is about 50% higher than a healthy BMI (BMI 18.5 to 25), and for a BMI of 35 the risk is more than doubled²⁰. There is also link between duration of overweight and mortality risk- those who have been overweight for the longest are at highest risk²¹.

Existing evidence on the relationship between education and obesity:

The existing evidence concerning the relationship between education and obesity is relatively limited and smaller number of studies focusing on lifestyles and on obesity in particular. The evidence available, covering a number of organizations of economic corporation and development countries, generally shows strong relationship between education and obesity. Those more year of schooling are less likely to smoke, drink a lot, to be overweight or obese or to use illegal drugs. Similarly the better educated are more likely to exercise and to obtain preventive care such as flu shots, vaccines, mammograms, pap smears and colonoscopies²². By looking at the difference between the sexes within a study of socio-economic factors and obesity, found that income, rather than education, had a greater effect on BMI and waist circumference in men, whereas higher levels of education for women resulted in lower BMI and waist circumference²³.

Childhood obesity:

The prevalence of childhood obesity is increasing globally and extends in to the developing world; for example, in Thailand, the prevalence of obesity in 5-12 year old children rise from 12.2% to 15.6% in just two years.

The major problem associated with childhood obesity is that those who were obese as children, but who are now normal weight are at an increased risk of morbidity and mortality. Excess adipose tissue associated with overweight has major detrimental implication on the body. It increases the work of the heart and leads to anatomical changes within it. It also alters the pulmonary, endocrine and immunological functions with subsequent adverse effect on health. Such alterations result in serious health complication including: cardiovascular disease; non- insulin dependent diabetes mellitus; obstructive pulmonary disease; hypertension and joint disease. Cancer is now strongly linked to obesity and related lifestyle choices.

Obesity and cancer:

Not only are obese people more susceptible to cancer, but their prognosis is significantly worse once diagnosed. Men that are obese are 33% more likely to die from cancer, and obese women have 50% higher chance of dying from breast cancer. The cancer more strongly associated with obesity is liver, colon and pancreatic cancer in men and breast, uterine, endometrial, kidney and cervical cancer in women.

Cardiovascular disorders and other health complications associated with obesity:

Obesity became officially classified as a disease in 1990 by the WHO. Obese people are far more likely to die from cardiovascular disorders primarily by hypertension, loss of glycaemic control and hyperlipidaemia, combining to vastly accelerate atherosclerosis. Obesity people appear to score less favourably on all of the psychological assessment scales, with symptoms ranging from sub clinical unhappiness to severe depression. Evident are more episodes of mood, anxiety, eating and personality disorders, often associated with or related to the obesity experienced by the individual²⁴.

Other metabolic consequence of overweight are the increased type 2 diabetes, sleep apnoea, gall bladder disease, breathlessness, asthma, social isolation, insulin resistance, day time sleepiness and fatigue, non alcoholic fatty liver, osteoarthritis,

stroke, respiratory disease, gout/ hyperuricaemia, hernia, certain cancers, varicose veins, reproductive abnormalities/ impaired fertility, musculoskeletal problems, polycystic ovaries, lower back pain, skin complication, stress, cataract oedema and cellulitis²⁵.

Economic consequence of an obese population:

A recent review found a positive relationship with overweight and obesity and long term sick leave in the workplace²⁶. A study examined the link between health and wealth in rich countries and found that healthier populations have higher earnings²⁷. The cost of obesity in the UK is estimated at up to £3.7 billion per year, including £49 million for treating obesity; £1, 1 billion for treating the consequence of obesity; indirect cost of £1.1 billion for premature death and £1.45 billion for sickness absence. By adding similar costs for the overweight population the estimation is nearer £7.4 billion per year. Unless the current trend in obesity is halted and reversed, the cost will be magnitude of £46 billion by 2050 (equivalent to four Olympic Games every year).

Pharmacist intervention on obesity:

Several studies have investigated potential models for pharmacist involvement in the provision of lifestyle and weight- loss management either alone or in collaboration with other health care providers. In recent study by Um et al, health care providers in Australia- including pharmacists, dieticians, exercise physiologist, physicians, and psychiatrist- were interviewed for insight into the development of a best practice model for pharmacy based weight management services. In general, the participants believed that pharmacist were well suited for delivering weight management services, especially given their regular contact with patients.

Participants felt that pharmacist were already well trained to perform basic physical assessment such as weight, waist circumference, blood glucose monitoring, and pharmacotherapy counselling, while additional training could be easily obtained for services that would encompass dietary counseling, guidance on physical activity, and behavioural counselling. The survey respondents also noted several barriers to implementation of pharmacist- based weight-loss counseling,

including the need for additional training and changes in current pharmacy practice models related to reimbursement for services and facility design that hinder effective, individualized counseling.

World health organisation (WHO) developed the growth references data for 5-19 years. It is a reconstruction of the 1977 National center for health statistics(NCHS)/WHO references and uses the original NCHS data growth standards sample for young children up to age 5²⁸. A study conducted among 2-18 children in Nigeria and revealed that males had higher BMI than females at age groups 11-14 years and 15-18 years²⁹. Fast food consumption is also associated with obesity, and it is also associated with higher intake of sugar, sweetened beverages and French fries and lower intake of milk, fruit and vegetables³⁰.

Evidence suggested that daily TV-Viewing in excess of 2 hours is associated upward in BMI³¹. Another study showed that overweight and obese children were more sedentary and higher screen time than normal weight children³².

In school age children, several studies have consistently reported that short sleep duration was an independent risk factor for obesity³³. A cross – sectional study conducted among 229 Mexican American 8-10 year old and concluded that children who slept less were more likely to have higher BMI Z-Score³⁴. Till about two decades ago, the issue of overweight was emerging as a public health concern primarily in children at high income countries and Western nations³⁵.

Cynthia. et. al., (2014) conducted a study in US, with 9120 people. The objectives of the study is to provide more recent national estimates of childhood obesity, analyses childhood obesity between 2003 and 2012, and provide detailed obesity trend analyses among adults. The needed participant's information is collected through nationally representing National health & nutrition examination survey. The study conclude that more than one third of adults and 17% of the youth in US are obese and there have been no significant changes in obesity prevalence in youth or adult

between 2003-2004 and 2011-2012. Obesity prevalence remains high.

G.D Dinsa.et.al.,(2012) undertook a systemic review of studies assessing the association between socioeconomic status(SES) and measured obesity in low and middle income countries (Defined by world bank as countries with per capita income up to US\$ 12275) among children, men and women. They concluded that low-income countries with low human development index (HDI) the association between SES and obesity appear to be positive for men as well as female. Those with higher education attainment tend to be more likely to obese. However in middle –income countries or in countries with medium HDI, the association become largely mixed for men and mainly negative for women. Obesity in children appears to be predominantly a problem of the rich in low and middle income country.

Shiny George.et.al., (2012) conducted a study in a rural area in Kerala with 173 students aged between 13- 18 years. The objective was to assess the prevalence of overweight and obesity and its influencing factors in adolescent school going children. Height and weight were measured and obesity was assessed using international obesity task force criteria. Details of influencing factors obtained using a pretested questionnaire. The result of the study revealed a high prevalence of overweight (16%) and obesity (7%). Prevalence of overweight and obesity was 19% and 6% among boys and 15% and 8% among girls respectively. Among the influencing factors sleeping time and fast food were found to be significant ($p=0.001$). The conclusion was increased prevalence of overweight and obesity in rural adolescent emphasizes the need of early intervention after an increase in BMI percentile children and adolescents.

The main objectives of the study was to find out the prevalence of obesity and the risk factors associated with obesity at a rural community pharmacy at Malappuram district in keala. Secondary objective was to find out link between prevalence of various disorders and obesity, whether education levels have any impact on weight management of people, and also the

awareness of people on hazards of obesity and if this awareness has any impact on BMI.

Those who visit the community pharmacy for any healthcare related need.

MATERIALS AND METHODS:

Any physical disability person also

Study type: Prospective Observational study

Exclusion criteria:

Study population/Setting: Customer visiting a retail rural pharmacy- totals 942 patients

Non consenters

Mentally disabled people

Study instrument: Questionnaire & BMI scale. One time observational interaction.

People with communication disabilities.

Study period: November 2014 to August 2015 (10 months)

RESULTS AND DISCUSSION

Age and Sex Wise Distribution:

Today the burden of obesity is heavy on the society. With globalisation the increase in sedentary lifestyle is also been witnessed. This has led to a faster lifestyle. With the increase in speed, people have no time for proper care of the health and self.

Study Criteria:

Inclusion criteria:

Both sex, age between 12 to 70

TABLE 1: AGE & SEX WISE DISTRIBUTION (N=942)

Age range in years	Male	Female	Total number of patients N=942	%Total
12-21	82	81	163	17.3%
22-31	143	121	264	28.0%
32-41	92	117	209	22.2%
42-51	114	63	177	18.8%
52-61	40	63	103	10.9%
62-70	19	7	26	2.8%
Total	490	452		

According to the **Table 1**, the maximum number of people in this obesity study has been from the 22-31 age groups with 28% of people falling in this group, and the least number is from 62-70 age groups.

BMI Distribution:

BMI is more relevant for the study and the data is also interesting. Out of all the study population only 6 i.e. 0.6% of the people were under the underweight category. Maximum were from the overweight category. Up to 43.3% of people were from this category followed by an alarming 33.5% of people who belonged to the obese I & II category. These 2 groups were followed by the normal BMI group with 22.5% of people in that group.

TABLE 2: BMI DISTRIBUTION REPORT (N= 942)

Class	No. of patients N=942	% of total
Under weight	6	0.6
Normal	212	22.5
Obese I& II	316	33.6
Over weight	408	43.3

Education Data:

Maximum of the people fell under the graduate or diploma group with 43.7% in that category of education. Followed by that 41.5% were from the post graduate background. The least in the study group was below higher secondary qualification.

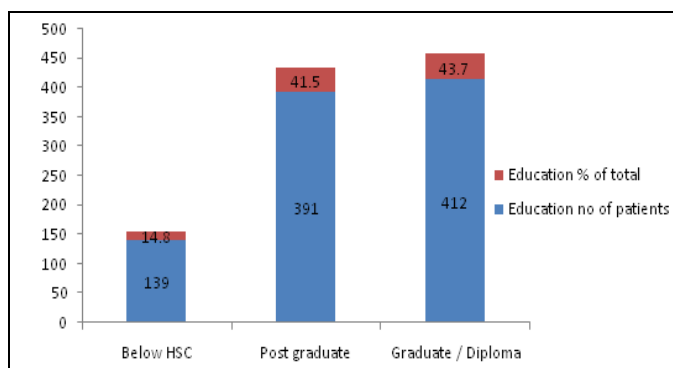


FIG. 1: EDUCATION DATA (N=942)

Occupation:

Occupation decides the amount of earning potential of the study population and leads to better health facilities. 54.9% of the population were employees and followed by 22.3% who came under the others category followed by 17.9% who were studying and in the end by the 4.9% of self employed.

Monthly Income:

Affordability to healthcare is one of the major factors that impacts on the health care access in Indian subcontinent. Up to 46% of the people belonged to the INR 10000-20000 per month earners and then followed by the 41% people who were in the bracket of above INR 20000 per month and then the least no of people belonged to below INR 10000 per month who amounted to about 13%.

Social Habits:

Many social habits impact on the health of public. In specific there are various references on the first hand smoke, the second hand smoke and the third hand smoke that affect people from various walks of life. In the current study 23% of the study population was found to be alcoholics followed by 4% of people who have the habit of chewing tobacco, hans and betel pan

Known Family History of Obesity:

When parents have obese the child has more chances of getting the same disease in future. Family history plays an important role in the passage of diabetes, hypertension etc. In our study, the highest number of parents suffering from obesity- almost 19.2% of the people who had their

parents suffering from the disease. This was followed by the next group where there was knowledge about the siblings suffering from the diseases- constituting up to 7.1% of the group who had family history. The least was the information the grandparents and the disease with about 5.6% who aware that their grandparents had such disease.

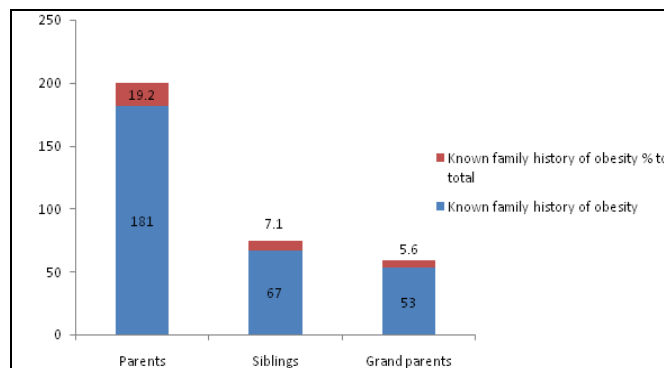


FIG. 2: FAMILY HISTORY DATA (N=942)

Medical History:

There are references that state that obesity has led to cardiovascular disorders had led to the occurrence of the metabolic disorders and vice versa. In current study, the highest number if people had a history of hypertension and cardiovascular disorders (23.2%). Up to 18.2% of the study population was from diabetes, 2.7% suffered by respiratory disorders followed by surgery in 4.15 and then the disease of other system by 7.9%.

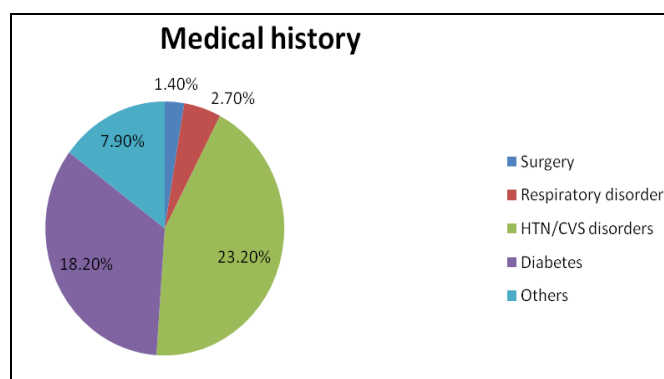


FIG.3: MEDICAL HISTORY (N=942)

Awareness about the Disease:

Awareness of anything leads to clarity and clarity leads to betterment of any situation. With awareness and education improvement the quality of care increases. In current study 26.2% were aware that obesity is one of the leading causes of

death. 73.8% of people were not aware that obesity is a major cause of death.

TABLE 3: AWARENESS ON OBESITY AS A LEADING CAUSE OF DEATH (N=942)

Awareness	No. of patients	% to total
Aware	247	26.2
Not aware	695	73.8

Obesity Seriousness:

How serious is obesity a problem? Is a question that was posed to all the participants of this study. And observed that 50.2% of the participants did not even know the seriousness of obesity as a problem of individual's health. 31.4% of people who participated thought that obesity is not a so serious problem to health and 12.1% felt that obesity is a serious problem.

TABLE 4: OVERWEIGHT AND OBESITY AS A SERIOUS PROBLEM (N=942)

Seriousness	No. of patients	% to total
Very serious	59	6.3
Serious	114	12.1
Not so serious	296	31.4
Don't know	473	50.2

Obesity Effects:

The following table depicts the effect of obesity. 43.3% were aware that obesity leads to various diseases and few could name some diseases also. 36.8% of people gave answer that hypertension or blood pressure was a major outcome of being obese. As high as 29.3% of people responded with diabetes as a major complication of being obese. 18.4% of people did not know the effect of being obese and 8.4% felt cancer is caused by obesity.

TABLE 5: OBESITY EFFECTS (N=942)

Effects	No. of patients	% to total
Many diseases	408	43.3
Hypertension	347	36.8
Diabetes	276	29.3
Don't know	173	18.4
Cancer	79	8.4

Obesity Causes:

When the causes of obesity were discussed, the highest we could find was 31.4% of respondents gave answer as lack of physical work followed by

28.7% participants who felt that lack of exercise is the major reason.

Causes	No. of patients	% to total
Lack of physical activity	296	31.4
Lack of exercise	270	28.7
Don't know	203	21.5
Bad food habits	114	12.1
Family /Genetics	59	6.3

TABLE 6: OBESITY CAUSES (N= 942)

Past Initiatives on Weight Loss:

On question about whether any past initiatives have happened on the weight loss program as obesity leads to various diseases and weight reduction is a part of decreasing the risk of obesity leading to various disease and disorder, the following table was the series of answers.

TABLE 7: PAST INITIATIVES ON WEIGHT LOSS (N= 942)

Initiatives	No. of patients	% to total
Any physical exercise regimen? Jogging /cycling	217	23.0%
Any diet control regime?	103	10.9%
Consulted a doctor for obesity?	42	4.5%
Any past medication for obesity management?	17	1.8%
Any surgery for obesity?	3	0.3%
Total	382	40.6%

Time Period for Obesity Initiatives:

When starting an initiative was a great deal, how long initiatives lasted determines whether the initiative was successful or not. Out of the total 40.6% of the population, who tried some or other way to reduce weight and control obesity, 26.3% Of the population could continue the effort only for less than 6 months duration only. Next highest was 8.2% of population who could sustain their efforts with for at least 6-12 months of duration. Only 3.4% people could sustain efforts beyond 13 months and only 2.4% could sustain efforts beyond 24 months.

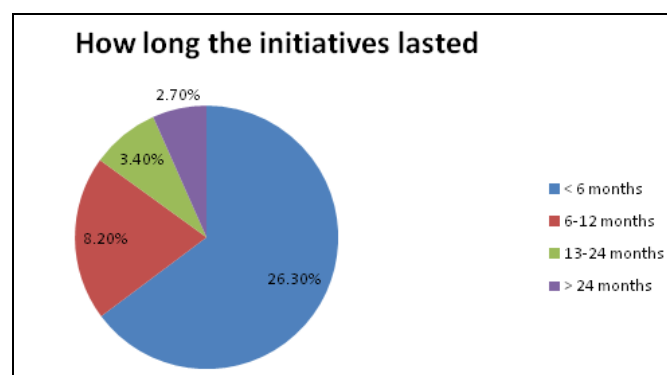


FIG.4: HOW LONG THE INITIATIVES LASTED (N=942)

Outcome of Obesity Reduction Initiatives:

On confronting with a question on whether the effort taken in the past by the study was a success or failure, 71% of the people who took some kind of effort to reduce weight felt that it was a failure (28.7% of the total study population). Followed by people who feel success, that is 15% of the people who took some initiatives to reduce weight (6.3% of study population). The remaining 14% could not decide or could not comment whether it was successful attempt or a failure (5.6% of the study population)

TABLE 8: EFFORT SUCCESS OR FAILURE (N=942)

Result	No. of patients	% to total
Failure	270	28.7
Successful	59	6.3
No comments	53	5.6

Reason for Failure of Obesity Reduction Initiatives:

When encountered about whether the effort was a success, it is also need to know the reasons for the failure also. 61% of the population who took an effort and failed had said "lack of will" was the major reason for failure which amounted to about 17.6% of the population.

TABLE 9: REASON FOR FAILURE (N= 942)

Reason	No. of patients	% to total
Lost will	166	17.6
Lack of support from friends and family	34	3.6
Lack of information	27	2.9
Lack of professional support	17	1.8
Others	26	25.9

CONCLUSION: The main objective was to study the prevalence of obesity, major risk factors and also the awareness of patients about the hazards of obesity. And it was found that out of all the study population, 43.3% of the people were from overweight and 33.5% were belonged to obese I & II category. Only 26.2% of the study population were aware about the obesity and its hazards remaining 73.8% were not. The major risk factor for obesity was found to be lack of physical activity (41.4%) and the least was family history and genetics (6.3%). Maximum number of the study population fell under graduate and the least was below higher secondary. The major concomitant disorder was found to be hypertension and cardiovascular disorder and the least was respiratory tract disorders.

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