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EFFECTIVENESS OF METFORMIN IN THE MANAGEMENT OF OBESITY AMONG ADULTS

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ABSTRACT

Introduction: Obesity and overweight are emerging health hazards.Current management is costly or intensive.Hence themanagement of obesity withMetformin has clinical significance.

Materials and methods: The randomized control study was conducted on patients attending obesity clinic of the Department of Physical Medicine&Rehabilitation,Medical College Trivandrum.2Patients are randomly assigned to two groups .Group I –**Life Style Intervention** alone &..Group II – **Metformin** 1000mg. sustained release tablet daily orally for six months along with **Life Style Intervention.**

Results: There is a significant reduction in the weight, BMI and fat percentage without hypoglycaemic effect in the metformin group when compared to the control group.

Conclusion: Metformin can be considered in the treatment of obesity

KEYWORDS : Obesity, BMI, Waist circumference,Metformin

INTRODUCTION

Over weight and obesity are defined as abnormal or excessive fat accumulation that may impair health[1,2]. The World Health Organization (WHO) defines over weight as a BMI equal to or more than 25 and obesity as a BMI equal to or more than 30. Latest definition of obesity for Indian population is BMI >25 obese. <18.4 under weight, 18.5 – 22.9 normal weight, 23 – 24.9 over weight. Body Mass Index (BMI) is a simple index of weight for height that is commonly used in classifying overweight and obesity[3,4]. It is defined as the weight in kilograms divided by the square of the height in meters (kg/m^2). According to 2001 National Family Health Survey (NFHS), the position of Kerala on prevalence of obesity among Indian states is 2nd rank, first is Punjab[5,6]. In Kerala male obesity is 24.3% and female obesity is 34%[7]. Obesity is effectively defined by assessing its linkage to morbidity or mortality.Intra-abdominal and abdominal subcutaneous fat have more significance than subcutaneous fat in buttocks and lower extremities[8]. This is clinically determined by the waist-to-hip ratio, with a ratio >0.9 in women and >1 in men being abnormal.

Easy accessibility of processed food, increased intake of energy foods high in fat and sugars but low in vitamins, minerals and other micronutrients, decreased physical activity, changing modes of transportation and increasing urbanization all contributes to obesity[2,3].

Commonly used medicines for obesity management are Sibutramine and Orlistat. They are costly and poor patients cannot afford. So the importance of metformin arises, which is a cheap drug and its efficacy and safety in the management of obesity was proven by many studies. In Trivandrum no study was conducted to check the efficacy of metformin in the management of obesity. If it works well in controlling obesity many of our patients will be benefited. Studies from many countries shows statistically significant decrease in BMI when metformin is added to obesity management along with life style intervention.

MATERIALS AND METHODS

This was a Randomized control trial in adults attending Obesity Clinic of department of PMR, Medical College, Thiruvanantha puram, a tertiary care setting, who satisfy inclusion and exclusion criteria.

(a) Inclusion Criteria

1. Patients with BMI >25
2. Age range 20 -60years
3. Those who are willing to comply with drug intake, exercise and diet management and willing for regular follow up.
4. Those who are willing to give consent.

(b) Exclusion criteria

1. Diabetes Mellitus on medications
2. Cardiovascular disease
3. Psychiatric illness
4. Hypertension
5. Mental retardation or cognitive impairment
6. Childhood Obesity
7. Drug allergy
8. Hypothyroidism

Patients fulfilling the inclusion and exclusion criteria are randomly assigned to two groups following **block randomization**.

0 – 4 = AB
5 – 9 = BA

1. Group I –**Life Style Intervention** alone.

2**.** Group II – **Metformin** 1000mg. sustained release tablet daily orally for six months along with **Life Style Intervention**.

Life Style Intervention – It includes home program of moderate aerobic exercises, 30minutes brisk walking daily on all days and dietary modifications advised to all patients by a qualified Dietician.

DISCUSSION

This is a randomized controlled study, comparing the effectiveness of Metformin 1gm sustained release tablet daily orally for six months along with conventional life style intervention and conventional life style intervention alone in obese patients with BMI >25 of the age group 20 to 60 years. Duration of the study is six months. Study started from 19th May 2011, after getting Human Ethical committee clearance and end on November 2012.

40 patients attending in the Obesity Clinic, Department of Physical Medicine and Rehabilitation, Medical College, Thiruvanantha puram, who were satisfying the inclusion and exclusion criteria were selected for the study by random box sampling technique.

Out of the 40 patients, only 3 were males and all others were females. This shows the trend in the Obesity Clinic where the majority of the patients were females Maximum participation is from the age group 30 to 39,.Regarding the education, majority is of having high school education, 20 out of 40. One participant is illiterate, 3 are having primary school education, 8 having pre-degree, 5 are having degree and 3 have professional education .Regarding occupation, majority of the participants were house wives, 26 out of 40. 5 were unskilled labourer, 4 were skilled labourer and 5 were professionals.

All participants were married and the majority of them, 23 have 2 children, 12 have one child each, 4 have three children each and one participant has five children. Three of the control group and one of the metformin groups were having past history of COPD. The P – value is 0.292. So the groups are comparable. Out of 40 participants, two of them have Claudication pain and are included in the control group. P – value shows 0.487. So the two groups are comparable. Majority of the study population were having normal sleep. Among the control group 16 out of 20 and among the metformin group 14 out of 20 were having normal sleep.

Regarding the musculoskeletal problems of the participants, 35 out of 40 were having history of Low back ache , 19 of control group and 16 of metformin group. P – Value is 0.339. 31 out of 40 participants had history of Cervico brachial neuralgia (Table 19), 17 of control group and 14 of metformin group. P – value is 0.449. 33 out of 40 participants had history of shoulder pain.Eighteen of control group and fifteen of metformin group. P – value is 0.405. 32 out of 40 participants had osteo arthritis knee, 17 of control group and 15 of metformin group. P – value is 0.693. 11 out of 40 participants had history of polyarthralgia, 6 of control group and 5 of metformin group. P – value is 0.723. In all cases P value was > 0.05. So the control and metformin groups were comparable.

Table 1- Change in weight

Change in weight	Intervention	N	Mean	SD	t	P
From first visit to 6 months	Control	20	1.49	1.48	-7.805	<0.001
	Metformin	20	5.88	2.03		
From first visit to 3 months	Control	20	1.18	1.40	-5.005	<0.001
	Metformin	20	3.37	1.38		
From 3 to 6 months	Control	20	.32	.53	-6.325	<0.001
	Metformin	20	2.51	1.46		

Table shows the change in weight seen in the control group and metformin group at the end of six moths study period, first three months and last three months. More marked weight reduction was seen in the first three months than the last three months in both the groups. Study clearly shows that weight reduction seen in both the groups but more weight reduction is in the metformin group. At the end of six months period, the mean weight reduction seen in the control group was 1.49 with a standard deviation of 1.48 and the mean weight reduction seen in the metformin group was 5.88 with a standard deviation of 2.03. P - value is < 0.001, which is significant.

Table 2 - Change in waist circumference

Change in waist circumference	Intervention	N	Mean	SD	t	P
From first visit to 6 months	Control	20	3.10	2.59	-1.464	.151
	Metformin	20	4.55	3.59		
From first visit to 3 months	Control	20	1.18	1.40	-5.005	<.001
	Metformin	20	3.37	1.38		
From 3 to 6 months	Control	20	.70	1.26	-1.007	.320
	Metformin	20	1.10	1.25		

TableCompares the change seen in the waist circumference in the control and metformin group at the end of six months, first three months and last three months. At the end of six months the mean reduction of waist circumference seen in the control group was 3.10 with a standard deviation of 2.59 and the reduction seen in the metformin group was 4.55 with a standard deviation of 3.59. P – value is 0.151, which is not significant. The observations in the table clearly shows that there is a significant reduction in the waist circumference of metformin group than the control group in the first three months of the study, P – value is < 0.001.

Change in waist circumference in each visit

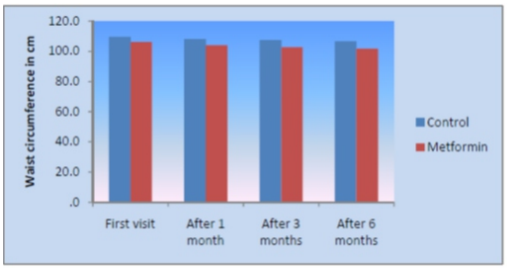
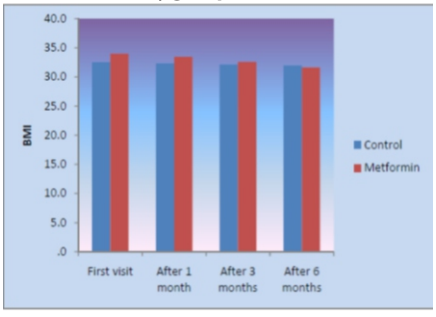


Table 3 - Change in BMI

Change in BMI	Intervention	N	Mean	SD	T	P
From first visit to 6 months	Control	20	.58	.78	-6.655	.000
	Metformin	20	2.45	.98		
From first visit to 3 months	Control	20	.45	.72	-4.453	.000
	Metformin	20	1.42	.65		
From 3 to 6 months	Control	20	.13	.21	-6.153	.000
	Metformin	20	1.03	.62		

Table gives a comparative evaluation of BMI in the control and metformin group at the end of six months, first three months and last three months. The change in the mean BMI of control group at the end of six months was 0.58 with a standard deviation of 0.78 and the changein mean BMI in the metformin group was 2.45 with a standard deviation of 0.98. P – value was 0. This mean change in the BMI is seen at the end of first three months and lasthree months, but the change was more in the first three months than the last three months.

Change in BMI in the study group



Study shows that metformin is effective in BMI reduction along with life style intervention.

There are studies available from many countries regarding the efficacy testing of metformin in the management of obesity over life style intervention. Eg:- Min Hae Park and Sanjay Kinra from London School of Hygiene and Tropical Medicine, United Kingdom, conducted a similar study on adolescent obese (The Journal of Pediatrics, Vol.157, No.1). They selected two adolescent obese groups and gave life style intervention to both groups and in addition gave 2gm sustained release metformin to group 1 daily for 48 weeks. Result shows that BMI increased by 0.2 in the life style intervention only group and BMI decreased by 0.9 in the metformin group.

In this study the BMI reduction in the metformin group was 2.45 with a standard deviation of 0.98. This difference of increased

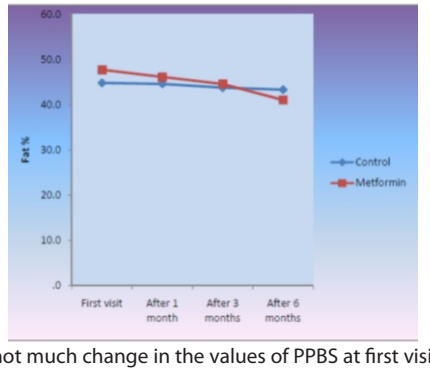
reduction of BMI to our population may be due to the food habits of .increased carbohydrate m. Hence the importance of metformin. The action of metformin is to decrease the absorption of glucose from the gastrointestinal tract, suppress glucose production by the liver and enhance peripheral glucose utilization. This shows the relevance of using metformin in the management of Obesity.

Table 4 - Change in Fat %

Change in Fat%	Intervention	N	Mean	SD	t	p
From first visit to 6 months	Control	20	1.50	4.96	-2.680	.011
	Metformin	20	6.65	7.02		
From first visit to 3 months	Control	20	1.05	6.71	-.885	.381
	Metformin	20	3.15	8.22		
From 3 to 6 months	Control	20	.45	3.58	-2.477	.018
	Metformin	20	3.50	4.19		

Table gives a clear picture of changes in the fat percentage seen in both the groups. At the end of six months, the mean change in the fat percentage of control group was 1.5 with a standard deviation of 4.96 and that seen in the metformin group was 6.65 with a standard deviation of 7.02. P – value is 0.011 which is significant

.Changein fat percentage



There is not much change in the values of PPBS at first visit, after 1 month, 3 months and at the end of six months in both the control and metformin groups.

So from the observations it is very clear that there is a significant reduction in the weight, BMI and fat percentage without hypoglycaemiceffect in the metformin group when compared to the control group. So we can consider the use of metformin in the treatment of obesity.

CONCLUSION AND RECOMMENDATIONS

Within the limitations of the study it is concluded that Metformin can be considered in the treatment of obesity.

1. Management of Obesity needs comprehensive approach with Physiatrist, Physician/ Endocrinologist, Nutrition specialist/ Dietician and Psychologist. Metformin is a very economic drug and the short term study of six months clearly shows its effectiveness in the reduction of weight, BMI and fat percentage without producing hypoglycaemia in non diabetic obese patients.

2. The study requires further follow up to know the long term effects and recurrence rates.

3. The drug needs to be tried in a larger sample size to have more authoritative report on its effectiveness in controlling obesity.

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