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Hypolipidemic and Antiobesity Impact of *Cuminum Cyminum* Powder in Overweight and Obese Females

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Abstract:-Obesity is detrimental issue worldwide; the therapeutic effects of some herbal plants due to their active constituents are proving to be effective against obesity. These characteristics of medicinal plants are also gaining attention in our society to fight with cardiovascular disease, diabetes and obesity. Abnormal bad lipid levels and increased body fat were considered risk factor for many diseases around the globe. Various researches point toward numerous activities of *Cuminum cyminum*, for instance, anti-fungal, anti-inflammatory, antioxidant, anti-diabetic, and hypolipidemic. The current study is designed to investigate the chemical composition of cumin and determined 7.56±0.55% moisture content, 19.22±0.1% protein, fat 23.3±0.6%, 11.43±0.4%crude fiber, ash and NFE are calculated to be 7.08±0.08% and 30.55±0.29% mg/dL, respectively. And evaluate the significant impact on lipid profile and anthropometric measurements. Production of white cumin powder is further followed by manipulating it against various biological parameters with special reference to body weight and lipid profile, for 2 months. Blood sample was compiled after the designated efficacy period, to be analyzed for serum lipid concentration. The obtained data subjected to statistical analysis by Two-way ANOVA. Results depicts that significant decrease in body weight, BMI, and other parameters while significant reduction in cholesterol, LDL, triglycerides but HDL ultimately increase significantly.

I. INTRODUCTION

Obesity and overweight is a prevalent disease in both developing and developed countries. Obesity ratio has expeditiously spread in last twenty years. Overweight and obesity is an imperative leading factor of mortality as well as morbidity. Worldwide, in 2015 a total number of 1.9 billion overweight and 609 million adults obese were approximated, representing around 39% of the world's population. In these proportion almost 38.5% men and 39.4% women were overweight, 10.1% men and 14.8% women obese were estimated (Chooi *et al*., 2018).

The strong relation between the BMI and level of total serum cholesterols as well as low-density lipoproteins and high-density lipoproteins levels noticed that in the overweight and obese the level of cholesterol is relatively high than normal people. Lipid profile could be a vital predictor of metabolic abnormalities (Pihl and Jurmae, 2001; Sandhu *et al*., 2008).

Medicinal plants along with their active ingredients are used as a substitute treatment to cure many ailments like cardiovascular diseases, hyperlipidemia, and diabetes. In addition, lots of people relied on medical herbs for improving health worldwide. Therefore the overall population of around 3.5 to 4 billion relied on therapeutic plants (Bahmani *et al*., 2015).

Cumin is a herbaceous flowering plant which belongs to Apiaceae family, is the old medicinal plant which cultivated in Asia, Africa, East India, and Europe. Cumin is known as "jeera" in India but it is popular as "zeera" in Pakistan. Its plant grows up with delicate branches stem which almost 20-30cm tall and their leaves are 5-10cm long. The fruit is lateral spindle-shaped containing single seed or 4-5mm long in size. Their flowers are also white or pink in color and small in size. Cumin seeds are somehow having similarity to anise and fennel seeds in appearances (Zohary and Hopf, 2000).

Cumin has vast medicinal worth, are used in therapeutic medicine system in India, especially for digestive problems. Seeds could use in inflammation, dyspepsia, and diarrhea (Yarnell and Abascal, 2011). Cumin could be used as flatus relieving, anti-inflammatory, antispasmodic, diuretic and also good for toothaches. Cumin also provides additional nutritional support for cure epilepsy, jaundice, and indigestion (Rebey *et al*., 2012).

Sufficient evidence is present in the article which depicts cumin's biomedical and biological activities, which also referred to its bioactive elements like phenolic compounds, flavonoids, and terpenes (Mnif and Aifa, 2015). The cumin has 60% cumin aldehyde, 22% flavonoids, and sugars, 2-5% volatile oil and the cumin contain a major

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active ingredient which is cumin aldehyde (Lacobellis *et al*., 2005; El-kani *et al*., 2007).

4-isopropyl benzaldehyde(Cuminum cyminum) is pleasant aromatic monoterpenoids (act as strong antioxidant in body) with $C_{10}H_{12}O$ molecular formula which is alternative of benzaldehyde, having one isopropyl group in the 4th position, volatile compound and it is also present in many others like Cuminum cyminum, Carum carvi, Cinnamomum cassia and others (Jensen-Jarolim *et al*., 1997). Cumin aldehyde is the major active component of cumin which inhibits alpha-glucosidase, as a result, diminishes the uptake of glucose in the small intestine. The function of aldose reductase is also inhibited, which elevates the production of reactive oxygen species (ROS) in tissues (Jagtap and Patil, 2010). Cumin also reduces free radical production and inhibits advanced glycated end products (Lee, 2005).

Cuminum cyminum have a significant anti-obesity effect and led to an affirmative reduction in weight and BMI. Overweight is contributed to developing various diseases like cancer, cardiovascular diseases, type 2 diabetes, and sleep apnea. Cumin has the potential to reduce weight, BMI, serum plasma lipids and reduce oxidative stress in the body (Haslam and James, 2005). Hence, the study was conducted to negotiate the compositional analysis of *cuminum cyminum* and evaluate the effect of cumin powder on body weight, BMI, lipid profile, and waist circumference in overweight and obese female.

II. MATERIALS AND METHODS

The randomized placebo clinical trial was conducted from 1 January 2019 to 3 March 2019 in Punjab, Pakistan. Cumin was grinded into fine powder by using electric grinder (Andallu and Ramya, 2007). Cumin samples was evaluated for proximate analysis in which moisture, ash, crude fat, crude protein, and nitrogen free extract according to their standard procedure described by the American Association of Cereal Chemists (AACC, 2000).

I was selected 50 females with >25kg/m^2 BMI, 20-45 years aged, non-smoker and physiological good for the study but unfortunately 20 females were quit between the trails. I divided into 2 groups. One is control group and other is experimental group. 15 subjects in each group. The crucial task was carried out by taking care of their body weight, BMI, and waist circumference evidences, lifestyle and fasting lipid profile. A recommended amount of 5g of *C. cyminum* powder in an empty stomach once every day with water was prescribed to the chose intervention group. Councel them about general guidelines and asked them to avoid junk foods. Blood sampling was carried out twice for lipid profile. First one day before the commencement of the trail to get base values of all the humans subjects and next was carried out on the very next day after the trail had ended (60 day) to evaluate the effect of cumin powder on every individual. Zero sampling was done before starting the research trails. Next sampling was done on 15th, 45th, and final 60th day.

Data acquired for each parameter will be analyzed using statistical model mentioned in Zare *el al*., 2014. Descriptive statistics will be presented as mean ± SD. For the primary analysis, I will be used two way ANOVA for analysis. All tests will be two-sided and P-values less than 0.05 will consider significant. All statistical analyses were performed using SPSS 13.

III. RESULTS

Investigation of proximate composition of cumin is significant in determining the quality of material being used in analysis. *Cuminum cyminum* was examined for many quality aspects, such as moisture, fat, fiber, ash, protein along with nitrogen free extract. These parameters make up ample components of proximate analysis.

According to the proximate results presented in Table *C.Cyminum* powder contain 7.56±0.55% of moisture content. The protein content present in the cumin powder weighted to be 19.22±0.1% whereas, fat content are determined to be 23.3±0.6%, crude fiber are calculated to be 11.43±0.4%, ash and nitrogen free extract are calculated to be 7.08±0.08% and 30.55±0.29% mg/dL, respectively.

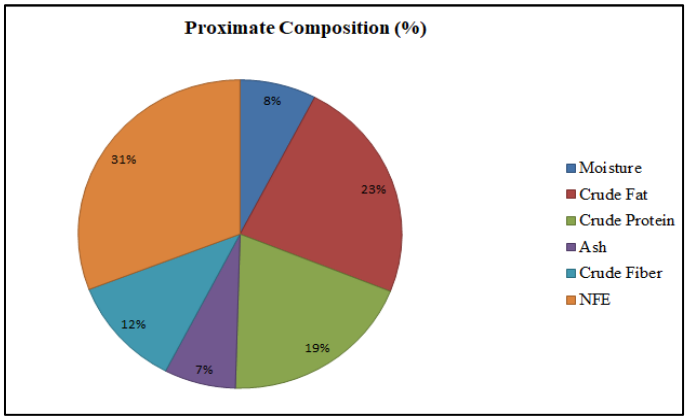

Fig 1:- Proximate Composition of (%) of *Cuminum cyminum* Powder

Mean square lipid profile (table 1) depicted that all parameters of fasting lipid profile was influenced highly significantly as a result of treatment. Days also influenced all parameter except triglycerides. The study time and their interaction with treatment remain highly significant for all parameters. This shows that treatment was highly influenced the lipid profile.

Means for total cholesterol content (Table 2) explained that significant pairwise variation in decrease of total cholesterol between both groups. While non-significant

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changes in cholesterol of control group at the end of trail was recorded (194.73±1.38 to 190.27±3.79). However, maximum significant reduction showed in total cholesterol in treated group after treatment which was determined (168.67±2.58 to 150.47±4.55).

Means for high density lipoprotein content (Table 3) illustrated that significant pairwise difference in increase of HDL between both groups. While non-significant variations in HDL of control group at the end of trail was recorded (39.80±1.49 to 39.33±1.80). However, maximum significant proliferation showed in HDL of treated group after treatment which was determined (44.40±1.74 to 55.47±0.94).

Means for low density lipoprotein content (Table 4) clarified that the significant pairwise differences in decrease of HDL between both groups. While non-significant drop in LDL of control group at the end of study was noted although slightly increase in LDL (83.20±3.00 to 84.20±1.28). However, maximum significant drop observed in LDL of treated group after intervention which was determined (96.80±1.52 to 78.87±1.34).

Means for triglycerides content (Table 5) elucidated that significant pairwise variation in decline of triglycerides between both control and treated groups. While non-significant alterations in triglycerides of control group at the end of efficacy was documented slightly increase in TGs (188.47±5.99 to 194.87±3.73). However, maximum significant lessening determined in triglycerides in treated group after trail which was determined (170.67±8.83 to 149.40±6.74).

Source of variation	Degrees of freedom	HDL	LDL	Triglycerides	T. Cholesterol
Day	1	421.35**	1075.27**	828.8^{NS}	1926.7**
Treatment	1	1612.02**	256.27*	15010.0**	16269.1**
Day x Treatment	1	498.82**	1344.27**	2870.4*	707.3*
Error	56	35.27	55.34	649.1	163.4
Total	59				

Table 1:- Mean Square for Lipid Profile of Participants Served With *C.Cyminum* Powder

NS = Non-significant (P>0.05); * = Significant (P<0.05); ** = Highly significant (P<0.01); HDL= High density Lipoprotein; LDL= Low density Lipoprotein; T. Cholesterol= Total Cholesterol

PARAMETERS	INTERVALS	GROUPS		MEAN
		Control	Treated	
TOTAL CHOLESTEROL (mg/dL)	Initial	194.73±1.38a	168.67±2.58b	181.70±2.81A
	day 60	190.27±3.79a	150.47±4.55c	170.37±4.70B
	Mean	192.50±2.02A	159.57±3.07B	

Table 2:- Mean for Total Cholesterol in Participant of Control and Treatment Group

PARAMETERS	INTERVALS	GROUPS		MEAN
		Control	Treated	
HIGH DENSITY LIPOPROTEINS (mg/dL)	Initial	39.80±1.49c	44.40±1.74b	42.10±1.21B
	day 60	39.33±1.80c	55.47±0.94a	47.40±1.80A
	Mean	39.57±1.15B	49.93±1.41A	

Table 3:- Mean for HDL in Participant of Control and Treatment Group

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PARAMETERS	INTERVALS	GROUPS		MEAN
		Control	Treated	
LOW DENSITY LIPOPROTEINS (mg/dL)	Initial	83.20±3.00b	96.80±1.52a	90.00±2.08A
	day 60	84.20±1.28b	78.87±1.34b	81.53±1.04B
	Mean	83.70±1.61B	87.83±1.94A	

Table 4:- Mean for LDL in Participant of Control and Treatment Group

PARAMETERS	INTERVALS	GROUPS		MEAN
		Control	Treated	
TRIGLYCERIDES (mg/dL)	Initial	188.47±5.99ab	170.67±8.83b	179.57±5.50A
	day 60	194.87±3.73a	149.40±6.74c	172.13±5.67A
	Mean	191.67±3.52A	160.03±5.80B	

Table 5:- Mean for Triglycerides in Participant of Control and Treatment Group

Mean square of BMI, weight, and waist circumference (table 6) depicted that weight, body mass index, and waist circumference was highly significantly influenced as a result of treatment. Study period or time intervals also influenced all parameter. The study time and their interaction with treatment remain highly significant for all parameters. This shows that treatment was effective and highly significant.

Means for weight content (Table 7) elucidated that significant pairwise variation in decline of weight between both control and treated groups, while on day 15, 30, and day45 slightly change which is non-significant. While non-significant alterations in weight of control group at the end of efficacy was documented (89.13±1.51 to 89.15±0.93). However, significant lessening determined in weight in treated group after first interval which was determined (92.17±1.08 to 87.03±2.02). On day 30 and day 45 is slightly influenced in weight which non-significant (86.42±1.93 to 85.02±1.77). While on final day of termination there was significant change in weight then control group and initial day which was observed (92.17±1.08 to 78.21±0.94). Treatment had great influenced on body weight of obese and overweight females.

Means for BMI content (Table 8) elucidated that significant pairwise variation in decline of BMI between both control and treated groups, while on day 15, 30, and day45 slightly change which is non-significant. While non-significant alterations in BMI of control group at the end of efficacy from initial day was documented (35.18±0.62 to 34.34±0.56). However, slightly lessening determined in BMI in intervention group after first interval which was determined (34.41±0.72 to 33.02±0.60). On day 30 and day 45 is slightly influenced in BMI (32.55±0.74 to 31.35±0.84). While on final day of termination there was significant change in BMI then control group and initial day which was observed (34.41±0.72 to 30.38±0.56). Treatment had great influenced on body mass index of obese and overweight females.

Means for waist circumference (Table 9) illustrated that significant pairwise variation decline in waist circumference between both control and treated groups, while on day 15, 30, 45 and day60 slightly change which is non-significant. While non-significant alterations in waist circumference of control group at the end of study was noted (89.14±0.98 to 90.27±1.16). However, significant lessening determined in weight in treated group after each interval which was determined at 0 day, 15th day, 30th day, 45th day, and on the final day of termination (98.20±1.45 to 94.63±2.05 to 92.39±1.62 to 90.20±1.48 to 88.33±1.67) respectively. There was significant change in waist circumference then control group and initial day which was observed (98.20±1.45 to 88.33±1.67). Treatment had great influenced on waist circumference.

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Source of variation	Degrees of freedom	Weight	BMI	W.C
Study period(A)	4	185.27**	23.113**	87.61*
Treatment(B)	1	345.35**	237.259**	421.95**
A x B	4	194.74**	16.970*	140.06**
Error	140	39.67	6.621	29.75
Total	149			

Table 6:- Mean Square for Anthropometric Measurements of Participants Served With *C.Cyminum* Powder

NS = Non-significant (P>0.05); * = Significant (P<0.05); ** = Highly significant (P<0.01); BMI= Body Mass Index; W.C= Waist Circumference

PARAMETERS	INTERVALS	TREATMENT		MEAN
		Control	Treated	
WEIGHT (kg)	Initial	89.13±1.51ab	92.17±1.08a	90.65±0.96A
	day 15	88.49±1.74ab	87.03±2.02b	87.76±1.32AB
	day 30	88.35±1.86ab	86.42±1.93b	87.38±1.33B
	day 45	88.91±1.93ab	85.02±1.77b	86.97±1.34B
	day 60	89.15±0.93ab	78.21±0.94c	83.68±1.21C
	Mean	88.81±0.71A	85.77±0.87B	

Table 7:- Mean For Weight in Participant of Control and Treatment Group

PARAMETERS	INTERVALS	TREATMENT		MEAN
		Control	Treated	
BODY MASS INDEX (kg/m^2)	Initial	35.18±0.62a	34.41±0.72ab	34.79±0.47A
	day 15	34.25±0.57abc	33.02±0.60bcd	33.64±0.42ABC
	day 30	35.14±0.70a	32.55±0.74cd	33.85±0.56AB
	day 45	35.38±0.68a	31.35±0.84de	33.37±0.65BC
	day 60	34.34±0.56abc	30.38±0.56e	32.36±0.53C
	Mean	34.86±0.28A	32.34±0.34B	

Table 8:- Mean For BMI in Participant of Control and Treatment Group

PARAMETERS	INTERVALS	TREATMENT		MEAN
		Control	Treated	
WAIST CIRCUMFERENCE (cm)	Initial	89.14±0.98cd	98.20±1.45a	93.67±1.20A
	day 15	88.74±1.08cd	94.63±2.05ab	91.68±1.26AB
	day 30	89.20±1.08cd	92.39±1.62bc	90.79±1.00B
	day 45	89.63±1.13cd	90.20±1.48cd	89.91±0.91B
	day 60	90.27±1.16cd	88.33±1.67d	89.30±1.01B
	Mean	89.39±0.48B	92.75±0.83A	

Table 9:- Mean For Waist Circumference in Participant of Control and Treatment Group

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IV. DISCUSSION

Nowadays increasing the demand for herbal medication in which cumin is also included for weight loss tenacity. Rather using the synthetic drugs that could have the harmful health effects the impression behind this is the plan to 'return to nature'. Furthermore herbal medicinal plants are generally cost-effective, locally available and securely consumable. These herbal treatments could decrease body weight and body metabolism by their bio-active chemicals (Haslam *et al*., 2005).

In 2002 a research conducted on diabetic rats to evaluate the hypolipidemic impact of cumin, which supported my study. This study was 6 weeks longed and rats were orally administered with cumin 0.25kg per body weight. After the trail effective and significant results were appeared that group who treated with cumin was showed reduction in weight with LDL, triglyceride, and cholesterol and glucose levels. But HDL was improved after 6 weeks trail (Dhandapani *et al*., 2002).

My study results also show the significant reduction in weight and LDL and others as Andulla's study. In Andallu's study almost 20 individuals were participated for research trails in two groups and ten in each group. In experimental group subjects were 40-60 years aged, diabetic (non-insulin dependent, and hyperlipidemic. He administered 5g cumin daily on empty stomach for 60 days with medication and observed strictly by the concerned diabetologist. After 60 days significant results came as my results. Patient showed significant improvement in their fasting glucose levels than control group. Author explained that cumin has 12% fiber in it and has potential to delay the stomach emptying therefore drop the postprandial blood glucose level of treated group. While along with improved glucose level of blood there is significant decline in free fatty acid (4%) in 2 months with the 5g of cumin. cumin had potentially decrease in lipid profile, cholesterol, phospholipids, LDL, triglycerides, and VLDL in blood, significantly (47%, 9%, 5%, 26% and 26.1%) respectively. While this study revealed that significantly 10% increased HDL observed in treated group with 5g dose of cumin per day for two months, and no health hazard of cumin were reported (Andallu *et al*., 2007).

The current study also depict that there is significant decrease in BMI also and according to Zare almost 88 overweight and obese female individual were selected for study for 3 months and 3g cumin per day were orally administered with yogurt at two meals with adequate counseling for weight loss. After three months, researcher were compared their all measurements with control group. 38-45years old added people were selected with high BMI above then 25kg/m^2. This study also conducted to evaluate the effect of cumin on lipid profile and body anthropometric measurements. And the end of 3rd month results revealed that added cumin to a low-caloric diet then noticed weight reduction, changes in BMI and waist circumference and made better body composition in overweight and obese while lipid profile is also influenced. In BMI of treated group -2.35kg/m^2 and -6.20kg weight reduction noticed than control group. Almost 8.22% reduction in the waist circumference, while 18.12% reduction observed in fat mass index, but in this study there was no significant reduction in fat-free mass. Lipid profile also showed significant variations, in triglycerides, LDL, and cholesterol -23.06mg/dL, -9.62mg/dL, and -26.48mg/dL reduction were observed respectively, while 1.84mg/dL increased in HDL level in blood. This study is also comparable with my study (Zare *et al*., 2014).

V. CONCLUSION

- Whole cumin seeds were grinded into powder and pack in plastic pouches to prevent lose volatile compounds. Whole cumin seeds were grinded into powdered. Cumin powder was subjected for proximate analysis. And analysis showed that *C.Cyminum* powder contain 7.56±0.55% of moisture content. The protein content, crude fat, crude fiber, ash and nitrogen free extract(NFE) 19.22±0.1%, 23.3±0.6%, 11.43±0.4%, 7.08±0.08%, 30.55±0.29% respectively. On the basis of significant results, it can be concluded that ant-obesity and hypolipidemic effect of *C.cyminum* on females. It has potential to raise HDL levels and decrease the LDL, cholesterol and triglycerides levels in the body. It contains high fiber and antioxidant that help in weight loss and raise HDL level. Overall results revealed that *Cuminum cyminum* has a huge medicinal potential to be use in treatment of obese patients and to reduce the different body fats contents and weight as well. It can be a better substitute of other traditionally used chemicals for the treatments of these body problems

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