FORMULATION AND EVALUATION OF POLYHERBAL TABLETS FOR MANAGEMENT OF OBESITY

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ABSTRACT: Obesity is a serious and chronic disease and a risk factor for life-related chronic diseases. Obesity is caused by an imbalance between energy intake (diet) and energy expenditure, as well as lack of knowledge about nutrition and excessive consumption of fatty substances. Causes basic calories, diet, exercise, genetics and medicine. Obesity is considered a major contributor to chronic non-communicable diseases worldwide. Herbs used in the formula are grape seeds (vitis vinifera), millet seeds, fenugreek seeds. The results of this phytochemical test revealed that papaya seed extract contains flavonoid alkaloids, condensed tannin carbohydrates. Content of flavonoids, carbohydrates and polyphenols, alkaloids in grape seed extract. Fenugreek (12.35%), grape (2.1%), papaya (7%) showed highest loss on drying (LOD). Total ash value result is highest by fenugreek (13.25%), grape (5.4%), papaya (11%). Changes in binding and dispersion ratios of different responses to softening, hardness, and fragmentation. Through this study, we concluded that this poly-herbal tablet is very important for the future management of obesity and is safer and more effective than allopathic medicines available in the market.

KEYWORDS: *Obesity, Herbal medicines, factors, polyherbal tablet.*

INTRODUCTION:

Obesity is a severe and chronic disorder that is also a risk factor for lifestyle-related chronic disease. Obesity is caused by an imbalance in the consumption of energy (food) and expenditure of energy, as well as a lack of knowledge about nutritional diet and excessive consumption of fatty materials. Excess fats are stored in the body's adipose tissue. This accumulation contributes to other chronic diseases and disorders in humans and acts as a risk factor. Secondary diseases include hypertension, coronary heart disease, hyperlipidaemia, Type II diabetes and a variety of other diseases and disorders. Obesity is thought to be a significant contributor to noncommunicable chronic disease worldwide.

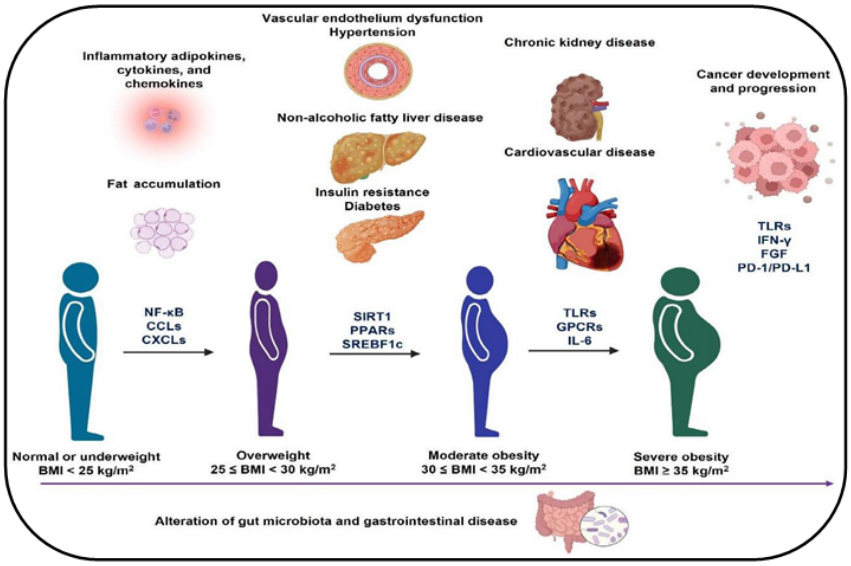

Figure 1.1: Diseases related to stages of obesity.

Obesity is primarily influenced by an imbalance in energy expenditure and product; however, other factors such as psychotropic treatment, steroid hormones, contraceptive methods, and protease inhibitors also play a major role in obesity occurrence due to drugs. Obesity is also caused by a decrease in physical activity in humans as a result of their previous lifestyle. Substances such as poly-chlorinated bi-phenols and certain alkyl phenols serve as system disruptors on the endocrine system, affecting normal function and contributing to obesity. In some cases, uncertainty in food intake time and frequency of meals also one of the main cause of obesity.[1]

One kind of medication is Lorcaserin, which inhibits pancreatic lipase activity and so reduces intestine absorption. Other classes of medicines, such as sibutramine, utilise the appetite-

suppressing mechanism. Apart from delivering anti-obesity benefits, these medications are associated with a variety of adverse effects such as headache, hypertension, sore throat, constipation, and others.

To tackle this problem, scientists have been investigating the possibilities of natural weight reduction solutions. A polyherbal medication with the therapeutic components of papaya seeds, grape seeds, and fenugreek is one such treatment. Papaya seeds is known for its digestive properties and is rich in fibres, which helps in reducing hunger pangs and promoting satiety. Grape seeds contain antioxidants that help to boost metabolism and burn fat, while fenugreek is believed to regulate blood sugar levels and reduce cravings for sweets.[2]

Because chemically synthesised medications have several adverse effects, the need for herbal anti-obesity medication is growing in market. Several medicinally valuable plants have been tested for anti-obesity efficacy using extracts of various solvents.

The current study aimed to develop and test a new polyherbal dispersible tablet combining aqueous extracts of several chosen plants with active phytoconstituents that have been scientifically established to help with obesity control.[3]

1.1 Obesity Causes:

Calories

Many people do not meet the recommended level of physical activity for adults, so the excess calories consumed are stored as fat in the body.

Diet

Drinking too much alcohol - alcohol includes a lot of calories dining out a lot - meals cooked in a restaurant may be higher in fat and sugar eating larger portions than necessary drinking too many sugary drinks - including soft drinks and fruit juice eating for comfort - Some people may comfort eat as a result of a variety of other things influencing their lives, such as low self-esteem or feeling down.

Physical activity

Obesity also affects the lack of physical activity. Many people work jobs that require them to sit at a desk all day. They also drive their cars instead of walking or cycling. Many people watch TV, surf the Internet, or play computer games to unwind and exercise regularly.[4]

Hereditary

Some genes have been linked to fat and overweight. Genes can influence how some people's bodies convert food into energy and store fat. People's lifestyle choices might also be influenced by their genes. Obesity can also be caused by rare hereditary diseases such as Prader- Willi syndrome. Some inherited genetic traits, such as anorexia, can make weight loss difficult, but not impossible.

Figure 1.2 General factors causing Obesity

Medical Reasons

Underlying medical problems can contribute to weight gain in some cases. One is an underactive thyroid (hypothyroidism), which occurs when your thyroid gland does not produce enough hormones. Cushing's syndrome is a common disorder characterized by an excess of steroid hormones. However, if this condition is diagnosed and treated properly, the barrier to wasting should be low. Certain medications, including certain steroids, used to treat epilepsy and diabetes, as well as antidepressants and psychiatric medications, can contribute to weight gain. Quitting smoking can sometimes lead to weight gain.[5]

1.2 Obesity Mechanisms:

There are many mechanisms through which obesity occurs few of them are major which we were studied that are,

Environment Factors

Environment factors favouring a positive energy balance and weight gain over the past several decades include increasing per capita food supplies and consumption, particularly of high-calorie, palatable foods that are often served in large portions ; decreasing time spent in occupational physical activities and displacement of leisure-time physical activities with sedentary activities such as television watching and use of electronic devices; growing use of medicines that have weight gain as a side effect.

Genetic Factors:

This are rare monogenic forms of obesity are now recognized, including a deficiency of the leptin and melanocortin-4 receptors, which are expressed mainly in the hypothalamus and are involved in neural circuits regulating energy homeostasis. Heterozygous mutations in the melanocortin-4 receptor gene are currently the most common cause of monogenic obesity, appearing in 2 to 5% of children with severe obesity. A widely used strategy to discover polygenic mechanisms conferring susceptibility to common obesity involves screening the entire genome in large samples with the goal of identifying single nucleotide polymorphisms associated with BMI and other traits linked with obesity.

Energy-Balance Dysregulation:

Energy balance is controlled by two sets of neurons in the hypothalamus arcuate nucleus that are suppressed or activated by circulating neuropeptide hormones. These neurons regulate food intake and energy expenditure. The microbiome and cells inside adipose tissue, stomach, pancreas, and other organs control both short- and long-term energy balance via a coordinated network of central mechanisms and peripheral signals. Reduced food intake or increased physical activity results in a negative energy balance and a cascade of compensatory adaptive mechanisms that protect key functions. Clinically, these effects may be associated with relative decreases in resting energy expenditure, food obsession, and a variety of other metabolic and psychological processes that are dependent on the amount and duration of caloric restriction.

Anatomical Effects:

Excess adiposity usually progresses gradually over time, with a long-term positive energy balance. The accumulation of lipids, primarily triglycerides, in adipose tissue happens concurrently with volume increases in skeletal muscle, liver, and other organs and tissues; extra weight in overweight or obese people involves varying proportions of these organs and tissues. When compared to a person who is not overweight or obese, an obese individual with stable weight has more fat and lean mass, as well as higher resting energy expenditure, cardiac output, blood pressure, and pancreatic -cell mass. Obesity is associated with an increase in macrophages and other immune cells in adipose tissue, which is due in part to tissue remodelling in response to adipocyte apoptosis. These immune cells generate proinflammatory cytokines, which contribute to the insulin resistance that is common in obese patients. Obesity is frequently associated with an increase in pharyngeal soft tissues, which can obstruct airways during sleep and result in obstructive sleep apnoea. Obesity also places mechanical strain on joints, making it a contributory factor for the development of osteoarthritis. An increase in intraabdominal pressure is thought to account for the increased risks of gastroesophageal reflux disease, Barrett's oesophagus, and oesophageal cancer in overweight or obese people.

Metabolic and Physiological Effects:

Adipocytes produce adipokines (cell-signalling proteins) and hormones, the rates and effects that are affected by the distribution and amount of adipose tissue present. Excessive proinflammatory adipokine release by adipocytes and macrophages within adipose tissue causes a low-grade systemic inflammatory condition in some obese people.

1.3 Obesity Management:

Exercise to lose weight

For an average adult at least 30 minutes of moderate physical activity is recommended on 5 or more days a week to lose weight and maintain the weight loss.

Management of diet

Obese people frequently cut their calorie consumption while increasing their physical activity. Adults are normally encouraged to eat a low-fat diet. The patient is recommended to consume 600 kilocalories (kcal) less than what is required to maintain his or her current weight. A low-calorie diet only gives 1000 to 1600 kcal for each day. Along with a reduction in calories, vitamins and essential elements are included in the diet to prevent shortages.

Medications for weight loss

Weight loss medications such as orlistat and sibutramine are sometimes recommended. They are not appropriate for every individual and are rarely used because to the potential of major side effects. The medications are often only advised for persons with a BMI greater than

30. Bupropion-naltrexone, Liraglutide, Orlistat, and Phentermine-topiramate are a few examples.

Surgery for weight loss

To decrease weight, surgery is sometimes recommended. There are various forms of surgery that can help you reduce weight. They entail shrinking the stomach to induce early satiety, resulting in smaller meals and lower calorie intake. An operation is only indicated for persons who are morbidly or very obese, as well as those who have tried and failed to lose weight using other means.

Weight loss programs

Dietary adjustments, physical activity, and behaviour therapy are all part of weight loss programmes. This may entail eating smaller meals, limiting specific types of food, and making a concerted attempt to exercise. There are several popular programs such as Weight Watchers, Overeaters Anonymous and Jenny Craig. This resulted in lower weight loss (2.9 kg; 6.4 lb) over two years compared to non-commercial diets (0.2 kg; 0.44 lb).

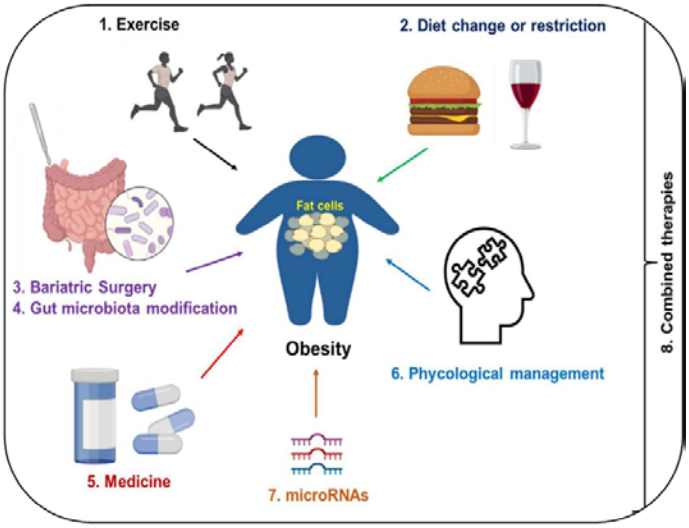

Figure 1.3 Obesity management therapies

Behavior changes

A behaviour modification programme can assist you in making lifestyle adjustments, losing weight, and keeping it off. Examine your existing routines to see what circumstances, stresses, or situations may have led to your obesity.

Counselling

Speaking with a mental health expert can assist in addressing emotional and behavioural difficulties associated with eating. Therapy can help you understand why you overeat and teach you good coping mechanisms for worry. Support groups-In support groups, you can discover companionship and understanding from others who face similar issues with obesity.

Endoscopic procedures for weight loss

These techniques do not necessitate any skin incisions. After you have been sedated, flexible tubes and tools are placed through your mouth and down your throat into your stomach. Typical procedures include, Endoscopic gastroplasty using a sleeve. Stitches are placed in the stomach to limit the amount of food and liquid the stomach can contain at one time. Eating and drinking less over time helps the average person lose weight. Weight loss with an intragastric balloon. Doctors insert a tiny balloon into the stomach during this surgery. The balloon is then inflated with water to reduce stomach space, allowing you to feel full while consuming less food.

2.1 MATERIAL AND METHODS

Table 3.1 Herbal drugs used in formulation of Polyherbal tablet

Sr. No.	Common and Botanical Name	Chemical Constituents	Properties
1	Papaya Seeds: *Carica papaya*	Kaempferol, Quercetin, Caffeic acid, Gallic acid, Chlorogenic acid, Fatty acids	Antioxidant, Anti- inflammatory, Protein lipaseinhibitor
2	Grape Seeds: *Vitis Vinifera*	Proanthocyanins, Resveratrol, Quercetin, Linoleic acid, Catechins	Protein lipase inhibitor, Antioxidant
3	Fenugreek Seeds: *Trigonella foenum-graecum*	Flavonoid, Polyphenol, Galactomannan	Hypocholesterolaemic, Antioxidant, Antilipidemic

2.1 Collection and extraction:

1) Grape seeds:

Grape seeds (Vitis Vinifera) is collected from fresh grapes after separation from pulp, Seeds are then dried by spreading the seeds out on a flat surface and allowing them to air dry. In this way after drying the seeds they are grinded and converted into coarse powder form for the extraction process.

Figure 2.1) Gape seeds (Vitis vinifera)

Kingdom: Plantae

Genus: Vitis

Family: Vitaceae

Order: Vitales

Species: Vitis vinifera

A sample of 2 g of powdered grape seeds was kept in a glass flask, and the volume was made to 100 mL with the 50% ethanol i.e., extraction solvent. Contents were dissolved by using a stirrer. Ultrasound-assisted extraction (UAE) was performed in a sonication water bath with a useful volume of 10 L. The working frequency and power were fixed at 40 kHz and 250 W, respectively. The temperature and time of extraction was controlled from the panel. After extraction, the flask was immediately cooled to room temperature by using chilled water. The extract was filtered through filter paper #5A under vacuum, and the solution was collected in a volumetric flask. It was then used for the determination of total phenolics compounds, antioxidants, and anthocyanin contents.

The phytoconstituents such as Resveratrol, Proanthocyanins, Quercetin, Catechin and Epicatechin of this extracted residue of grape seeds are proven to be very effective in obesity management. This all phytoconstituents collectively give anti-obesity activity.[21]

2) Papaya seeds:

The papaya, papaw, or pawpa is the plant species Carica papaya, one of the 21 accepted species in the genus Carica of the family, Caricaceae. papaya collected from market and seeds sun dried. In papaya seeds Carpaine; this alkaloid has been shown to have anti-obesity effects.

Figure 2.2) Papaya seeds (Carica Papaya)

Kingdom: Plantae

Genus: Carica

Family: Caricaceae

Order: Brassicas

Species: Carica papaya

By inhibiting the activity of pancreatic lipase, an enzyme involved in the digestion of dietary fats, By reducing fat absorption, carpaine may help prevent weight gain and improve lipid metabolism. Flavonoids; several flavonoids found in papaya seeds, including kaempferol and quercetin, have been shown to have anti-obesity effects by reducing inflammation and oxidative stress, both of which are associated with obesity and metabolic disorders. Saponins; these compounds have been shown to have anti-obesity effects by reducing the absorption of dietary fats and increasing energy expenditure. Saponins may also help regulate blood sugar levels and improve insulin sensitivity, which are important factors in the development of obesity and metabolic disorders. Phenolic compounds; several phenolic compounds found in papaya seeds, including chlorogenic acid and gallic acid, have been shown to have anti-obesity effects by reducing inflammation and oxidative stress, and improving glucose and lipid metabolism. Fatty acids; papaya seeds are a good source of omega-3 and omega-6 fatty acids, which have been shown to have anti-obesity effects by reducing inflammation and improving lipid metabolism.

In order to modify the study, papaya seeds are extracted utilising the maceration process. The drying procedure time is reduced by two weeks in this study. The papaya seed ethanol extract was created by drying the dark brown seed of ripe Carica papaya Linn. at room temperature, away from direct sunlight, and then processing it in Materia Medika, Batu-Malang. The moist papaya seed was cleaned with water and blended to shrink the size. Up to 500 g of the papaya seed powder was macerated with 70% alcohol solution for 3 days before being filtered through a Buchner funnel using white cotton fabric. The filtrate was then evaporated until it reached the optimum level of dryness at 40°C, yielding a thick extract form with a solidity of 24.0% (w/w). The extraction process was repeated four times, and the solid powder generated was weighted before being placed in a refrigerator at 4°C.

3. Fenugreek:

Seeds of fenugreek were purchased from local retail market. The seeds were cleaned before drying it in oven at 50 °C for 24 h. Then, the dried seeds were ground using a mill. Fenugreek (Trigonella foenum-graecum; TFG) belongs to the family Fabaceae and is used in many parts of the world for the treatment of diabetes. TFG seeds are employed as an active ingredient in ayurvedic weight loss and anti-cholesterol formulations. TFG seeds have been demonstrated to have hypoglycaemic, hypolipidemic, and antioxidant properties. Protein and amino acid

supplements in the diet have been demonstrated to lower plasma lipid levels. TFG seeds have a high nutritional value since they contain around 26% protein and 48% fiber, and they may have a lipid-lowering impact. Fenugreek seeds contain dietary fibres (galactomannan), which are polysaccharides with a mannose backbone and galactose side chains connected at position C6. Galactomannans are linear chains of (1-4) diequatorially connected D-mannose residues; some have single-sugar D-galactose side chains coupled by (1-6) glycosidic bonds. In the gut, fenugreek galactomannan forms a thick gel that inhibits glucose and lipid absorption.[22]

Figure 2.3) Fenugreek seeds (Trigonella foenum-graecum)

Kingdom: Plantae

Genus: Trigonella

Family: Fabaceae

Order: Fabales

Species: Trigonella foenum-graecum

The dietary fibres such as galactomannan from fenugreek seeds appear significant anti-obesity function by forming viscous gel in the intestine and inhibiting glucose and lipid absorption. Trigonelline attenuated the adipocyte differentiation and lipid accumulation in 3T3- L1 cells.

EXPERIMENTAL WORK

3.1 Tablet Formulation

3.1.1 Phyto-chemical investigations:

The Phyto-chemical investigation was carried out for all three crude drug materials for the identification of different classes. In this investigation we found our interest compounds present in Papaya seeds extract, Grape seeds and Fenugreek seeds. Investigational classes of Phytoconstituents are Condensed tannins, Flavonoids, Alkaloids, Phenolic Compounds, Galactomannan, Carbohydrates.

3.1.2 Physico-chemical investigation:

1) The total amount of ash The total amount of ash is about 2-5 grams of raw material, and put it in the most important place in the furnace. Heat the raw material to a carbon-free ash at a temperature of 500-600°C, then cool, weigh the ash produced and calculate using the formula:

Total ash (%) = [Weight of the total ash obtained/weight of the crude drug] x 100

2) Loss on drying (LOD)

Weigh about 2 g of raw material and place it in a porcelain dish. Place in the oven at a temperature of around 100-105 °C until a steady weight is achieved, then cool and weigh.

Loss on drying = Initial weight of the raw material − Final weight of the raw material

3.1.3 Precompression studies:

1) Bulk density

Bulk density was carried out in 100 ml dried measuring cylinder. Pouring of dried granules in measuring cylinder and calculated by using the following formula.

Bulk density = Mass of the granules/Bulk volume of the granules

2) Tapped density

The tapped density parameter is carried out using a density tester device. The density tester's graduated cylinder is filled with a known mass of powder and then secured to the equipment. The testing apparatus is tapped for 100 taps from a set height of 14 mm and another 3 mm on the surface of the density tester, or until a constant volume is detected, and then the tapped density is computed using the following formula.

Tapped density= Granules weight/Volume of tapped granules

3) Hausner's ratio

Hausner's ratio is the ratio of the tapped density of granules to the bulk density of granules. Calculated by using the following formula.

Hausner's ratio= Tapped density/Bulk density

4) Carr's compressibility index

Compressibility is estimated by combining the values of bulk density and tapped density and then inputting them into the formula. Carr's index, also known as compressibility index, is calculated using the following formula.

Carr's Compressibility Index= 100 (Vi – Vf)/Vi

Where,

Vi = initial volume of the powder before tapping process

Vf = final volume of the powder after tapping process

5) Angle of repose

The funnel method was used to analyze the angle of repose of the powder. The powder mixture is taken and poured into a funnel to allow the mixture to settle. This funnel is changed so that the tip of the cone pole just touches the bottom end of the funnel. The base diameter of the mixed pile and the height of the pile were measured three times and the average diameter was calculated. This formula is also used to determine the angle of repose.

$$\Theta = \text{Tan-1}[h/r]$$

Where,

h = height of granule cone formed.

r = radius of the granule cone formed.

3.2 Formulation of tablets

The plant extracts and excipients are weighed in accordance with the formula prepared with the help of research articles, which is given in below table. The components are thoroughly blended and sieved to get a uniform combination of the ingredients. The mixture is transferred to a tablet press, where the tablets are compressed using a direct compression process.

Figure 3.1 All herbs (Papaya seeds, Fenugreek, Grape seeds)

Table 4.1: Formula table

Ingredients	Quantity
Papaya seeds	150mg
Grape seeds	150mg
Fenugreek seeds	150mg

Lactose	15mg
PVPK-30	10mg
Microcrystalline cellulose	30mg
Magnesium stearate	6mg
Talc	4mg

3.2.1 Procedure

Weighing of Herbs:

The appropriate herbs based on the intended purpose of the polyherbal tablet are weighed precisely ensuring zero error.

Extraction

The active ingredients are extracted from the selected herbs using a suitable solvent alcohol(ethanol), by solvent extraction method with intense care and observations.

Concentration

The extracted solution is then concentrated to obtain a high concentration of the active ingredients in the end for better therapeutic effect of herbs.

Blending

The concentrated solution of each herb is mixed in the desired proportions to obtain the final mixture for further formulation processes.

Particle Size Reduction

Then the particle size of the blended mixture is reduced by sieving the mixture from sieve no.80 to enhance its compressibility.

Addition of excipients

Excipients like binders, disintegrants, lubricant and anticaking agent to improve its flowability and prevent sticking to the compressing die during compression.

Compression

The mixture which is weighed accurately as 515mg, each tablet is processed for the direct compression in tablet compression machine.

Evaluation of tablet

Further evaluation of tablet is performed to check the stability and the therapeutic effect.

3.2.2 Post-compression studies

The average of all post-compression study is evaluated from multiple measurements taken to determine the final record.

Hardness

A Monsanto hardness tester was used to measure tablet hardness and the hardness was recorded in kg/cm2.

Thickness:

The thickness of the plate is measured using ordinary dial gauges and the thickness is recorded in mm

Diameter

The diameter was measured in mm using serial dials and the data was recorded.

Friability

Roche friability tester is used to check the friability of tablets. The initial tablet weight is determined by taking twenty tablets from each batch and weighing them together. The pellets are then inserted into the tool, which rotates for 4 minutes or 100 spins. (25 rpm). Finally, the pellets are extruded and pulverized. The dedusted tablet is weighed and recorded as the final weight, and friability is calculated as follows:

$$\text{Percentage of Friability} = (\text{Initial weight} - \text{final weight})/\text{Initial weight} \times 100$$

Weight variation

Twenty tablets were removed from each bath and weighed independently in order to evaluate the weight changes in the tablet composition. The average weight of the tablets was determined and then entered into the calculation procedure.

$$\text{Weight variation} = \text{individual weight of the tablet/ average weight of the tablets} \times 100$$

Disintegration

Tablets are dispersed using a disintegrator. 900 ml of distilled water was poured into a separatory container and six tablets from each batch were placed into the apparatus. The temperature was maintained at 37 2 °C. The frequency was adjusted to 28-32 cycles per minute and the time required to dissolve the drug was recorded; the time taken for standard tablets should not exceed 15 minutes.

4.0 RESULT AND DISCUSSION

4.1 Results of Preformulation

1. Phyto-chemical investigation

Table 4.1 Results of phyto-chemical investigations

Test	Papaya Seeds	Grape Seeds
Alkaloids	+	-
Flavonoids	+	+
Condensed Tannins	+	-

Carbohydrates	+	+
Polyphenols	-	+

2. Physico-chemical investigation

Table 5.2 Results of physico-chemical investigation

Parameters	**Papaya Seeds**	**Grape Seeds**	**Fenugreek seeds**
Loss on drying	**7%**	**2.1%**	**12.35%**
Total Ash value	**11%**	**5.4%**	**13.25%**

4.2 Results of formulation

1. Pre-compression

Table 4.3 Results of pre-compression studies

Parameters	**Angle of repose**	**Bulk density**	**Tapped density**
Result	**31°**	**0.555gm/cm^2**	**0.697gm/cm^2**
Parameters	**Carr's index**	**Hausner ratio**	
Result	**20.4**	**1.248**	

2. Post compression:

Table 4.4 Results of post-compression studies

Parameters	**Hardness**	**Thickness**	**Diameter**
Result	**4.5kg/cm^2**	**4.1mm**	**11mm**
Parameters	**Friability**	**Weight variation**	**Disintegration**
Result	**0.6%**	**515±5**	**14min20sec**

6. DISCUSSION:

1. Phytochemical investigations

Pre-formulation research begins with phytochemical research. In the phytochemical study, both extracts were tested for the presence of phytochemicals. Phytochemical qualitative tests were carried out separately for the two extracts. Major classes such as alkaloids, carbohydrates, flavonoids, tannins, and steroids were analyzed qualitatively. The results of this phytochemical test revealed that papaya seed extract contains Carbohydrate Condensed Tannin Flavonoid Alkaloids. Flavonoids, carbohydrates and polyphenols, alkaloid content in grape seed extract, the results are shown in Table 4.1.

2.Physicochemical investigations

The parameters carried out under physicochemical investigation were loss on drying (LOD), ash values such as total ash. Extracts are treated separately for physicochemical analysis. The results are presented in the table. The highest percentage of loss on drying (LOD) was shown by fenugreek (12.35%), grape (2.1%), papaya (7%). The result of total rye value parameter was highest represented by fenugreek (13.25%), grape (5.4%), papaya (11%).

3. Pre-compression parameters

Pre-compression parameters used in formulating poly-vegetable tablets are angle of repose, bulk density, bulk density, Carr compressibility index and Hausner ratio. For better tablet compression, it is important that the pre-compression parameters show a better response. The answer shows the properties of flow, damping and compressive properties. The pre-compression parameter data is shown in Table 5.3, which shows the data for pre-compression parameters.

4. Post-compression parameters

Post-compression parameters are aspects of quality control of compressed tablets. Changes in the binder-to-dispersion ratio vary in response to hardness, softness, and fragmentation. Other quality control parameters reported are variations in thickness, diameter and weight. The result of mass after compression is shown in Table 4.4.

CONCLUSION:

Obesity is a serious and chronic disease and a risk factor for life-related chronic diseases. Various obesity Causes, mechanisms and management were thoroughly studied in this research. Herbal products may contain combinations of several different herbs or a single herb and believed to have complementary or synergistic effects. The herbal tablet was formulated using seeds of Vitis Vinifera, Carica papaya, Trigonella foenum-graecum. In Vitis Vinifera seed, phytoconstituents such as Resveratrol, Proanthocyanins, Quercetin, Catechin and Epicatechin present which proven to be very effective in obesity management, It shows protein lipase inhibitory and antioxidant activity. In Carica papaya seeds, kaempferol and quercetin show anti-obesity effects by reducing inflammation and oxidative stress. In Fenugreek seeds Flavonoid, Polyphenol, Galactomannan present which shows Hypocholesterolaemic, Antioxidant, Antilipidemic activity. In this way above mentioned herbs have better role in management of obesity, By this study we conclude that this polyherbal tablet is very crucial for obesity management in future and also it is safe and effective than other allopathic drugs available in market.

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