



Fad diet: A myth or reality?

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Abstract

Fad diets are considered to be the fastest approach in losing weight. These diets are considered harmful because they often eliminate those important nutrients that are needed for the maintenance of good health. Often, the research on these diets is faulty so they can change body's chemistry as well. Fad diets have taken over peoples' minds and are endorsed by celebrities over media as they believe they will get quicker fixes, longer life spans and miraculous cures. One of the desired methods to weight loss is low carbohydrate diet which involves Atkins Diet in which Ketosis stage is induced with higher fats and little carbohydrates. The Ketogenic diet that gives priority to restriction of carbohydrates than to fats. High protein diet involves protein in exceeded amount combined with low carbohydrate intake. Zone diet is a popular fad diet. Low fat diets were discovered for the treatment of heart diseases along with intermittent fasting or calorie restriction methods. Some diets were introduced according to blood group to reduce risk of some diseases but they always lack some of the major nutrients and by not receiving the right amount of nutrients, one can pose greater risk to life and chances of developing serious health problems can increase.

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Introduction

Fad diets can be defined as any diet that is not supported by evidence-based data and is unrealistic, not having any scientific basis. They were developed in the early 19th century, fad diets claim health promises and healthy lifestyle along with extreme weight loss, often with the omission of entire food groups. It is an important topic for nutritionists and clinicians because of their popularity in the public especially among the obese people for the weight loss purposes (Navaro *et al.*, 2017). Fad diets can be taken from two perspectives – macronutrient intake in specified portions or intake or averting of specific foods. The diets that are based on macronutrient content can have a low CHO diet, increased protein diet, and low content fat diet (Saltzman *et al.*, 2001).

Individuals are getting more susceptible to adopt various fad diets that claim to aid in losing weight to help in shedding pounds very quickly. As expressed in CDC's "Healthy Weight – It's not a diet, it's a lifestyle!" a prevailing fashion diet is any weight-reduction plan that guarantees snappy outcomes and is typically a brief dietary change. These weight control plans are viewed as undesirable as they give people fewer calories and nutrients. Every year, many new fad diets prevail in the general public especially for the overweight's who are very conscious about it. "Fad" diets usually are at the top of bestsellers' list, even though they have no scientific basis and are possibly dangerous.

In most cases, the author is advertised as an authority for weight loss who has invented a brand new, comprehensive, and a revolutionary solution to obesity. As it is understood that there is no miraculous cure to obesity, the only way is to take fewer calories and burn more to lose excess fat but the fad diets' books keep on selling and the general public believing thus hoping for some prodigious cure (CDC, 2014; Mirkin and Shore, 1981).

Nowadays people have started reinstating to the 'extreme' diets or 'quick fix' which assures them rapid weight loss, miraculous cures, prevention of certain diseases, and longer life spans. These diets are always

unbalanced, and the macronutrient proportion never meets the recommendations of the person body's need. They are often very low in fat or have low carbohydrate contents. They are not only imbalanced but also pose severe health risks to the no time or within a very short time bringing along several health problems when people prefer opting for these extreme diets that is why it is observed that the rate at which these diets pick up the peaks of peoples' mind is always slower than the rate at which it vanishes completely (Joshi and Mohan, 2018).

Most of the previous studies related to fad diets had only one or more common health issue to discuss. The aim of this review is to present objective awareness into two of today's renowned fad diets that is intermittent fasting and ketogenic diet. In a previously published review, function of these diets is elaborated in relation to cardiovascular diseases (D'Souza *et al.*, 2020). In another study, the author discussed the effects of losing some pounds over following fad diet and how it posed certain side effects on the health of their mouth and teeth (Tramboo, 2020). One review discussed the basic impact of celebrity/fad diets is discussed along with sustainable weight loss strategies and its effect on type 2 diabetes mellitus (Scrivens, 2015).

In our study, we have discussed all the major diets under one umbrella of faddism such as low carb diets (Atkins diet, ketogenic diet), high-protein diet (zone diet), low-fat diet (Eat more, weigh less), Intermittent fasting, Eat right for your type, ABO blood type, that people believe and perceive are very helpful and beneficial for the purpose of weight loss along with their complete mechanisms, effectiveness, evaluation and adverse effects on health while in other studies only a few types or some of them were discussed with the exclusion of their potential long-term harmful effects that are not elaborated elsewhere.

The aim of our study is to educate people about the potential adverse effects of these diets if followed for long-term so that people can get a better perception and understanding of these diets.

Classification of diet

Diets can be categorized into low-carbohydrate (high-fat) diets, high protein, low-fat (high-carbohydrate) diets, and other diet manners used for weight loss.

Low carb diets:

One of the popular approaches to weight loss is the low carb diet. A Low carb diet is generally pretended to be high in protein, but the basic specification is low carb intake. High levels of protein and fat are present in low carb foods- intake of low carb food automatically leads to increased fat and protein intake. (Saltzman *et al.*, 2001) Examples include the Atkins diet and the Ketogenic diet:

Atkins diet

Dr. Robert Atkins was a physician and a cardiologist, born in the United States. He developed the Atkins diet in the early 1970s. As the Atkins website says, Dr. Atkins challenged the traditional weight loss methods and proposed a new and nutritional approach that did not require eating less. His methodology required that the participants "Eat right, not less", so that greater energy can be created with a higher metabolism, while less stored fat. He developed the Atkins diet for weight loss purposes. It allows the intake of fat why the carbohydrates are restricted. While in the Atkins diet, fats are allowed for intake, in the modified Atkins diet, fats are encouraged for intake. It is modified as the induction phase of the diet with the ultimate goal of epileptic seizure control. The ketogenic diet restricts the protein intake and the number of calories, but the Atkins diet allows the intake of protein. It encourages the intake of such means which contain 60% fat, 30% proteins, and the rest of carbohydrates. A pie chart showing the macronutrient composition of the Atkins diet can be seen in Fig. (1).

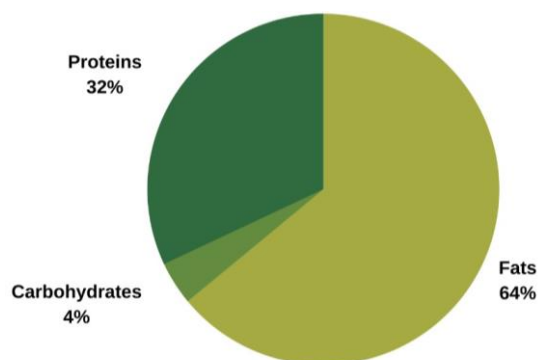


Fig. 1. The macronutrient composition of the Atkins diet.

In this diet, a ketosis stage is induced in which the higher fats are provided with a little carbohydrate. Since the Atkins diet does not restrict calories, it could work by having a direct approach to ketosis. The low glycemic index diet experiments with the quality of carbohydrate, not the amount of intake (Sharma *et al.*, 2012).

Mechanism

The Atkins diet is distinguished by a low intake of carbohydrates, a high intake of proteins, and ketosis. It is a four-phased diet in which the person eats meat, fatty fish, and eggs along with low-carbohydrate vegetables, nuts and seeds, and full-fat dairy. The person is encouraged to intake healthy fats like extra virgin olive oil and avocados. The foods such as sugars and starches, grains, high carbohydrate fruits and vegetables, and legumes are to be avoided by the dieter. Following are the four phases of the Atkins diet.

Phase 1: This is the initiation stage, where most carbohydrates are narrowed down in diet, consuming only 20g (10 percent) of total carbs each day, vegetables mostly. Rather than obtaining 45 to 65 percent of daily energy from carbohydrates. "Basic" vegetables, like broccoli, celery, green beans, peppers, asparagus, and cucumbers should provide 12-15 g of daily carb requirements.

Phase 2: This is the balancing stage, where a minimum of 12-15g of total carbohydrates are consumed. Foods with added sugar are also avoided.

Phase 3: This is the pre-maintenance stage, where there is a gradual increase in the range of foods that can be eaten.

Phase 4: This is the lifetime maintenance, it starts once the goal weight has been achieved. (Kefalas, 2020).

According to the Atkins website, the participants of this diet should use dipstick urine tests and monitor the amount of the ketone in their urine and ensure their presence. The supporters of the Atkins diet claim that it is a faster and better weight loss method as compared to other diets. And that it also decreases the risk of cardiovascular diseases. (Auvin, 2012; Sharma *et al.*, 2012; Tonekaboni *et al.*, 2010).

Is the modified Atkins diet effective?

It is indicated that in the modified Atkins diet, the risk of growth impairment and kidney stones, as well as dyslipidemia is lower as compared to the ketogenic diet because it allows an increased consumption of protein and decreased intake of fat. However, this hypothesis is yet to be proved by a study. Some reportedly beneficial effects of the modified Atkins diet include:

- Improve concentration
- General well-being and fitness
- Fluent speech
- Enhanced and improved mood
- More erect and straight posture

The ketogenic diet is further conservative and strict than the modified Atkins diet because of comparatively fewer dietary restrictions. Kossoff et al. hypothesized that this diet can cause and generate metabolic ketosis and lower epileptic seizures, just as the ketogenic diet does. The published study in 2003, conducted on 6 patients with age ranging from 7-52 years. Atkins diet was used by these patients as a treatment of unmanageable epilepsy. Out of the five patients were able to sustain ketosis for a period of six weeks to twenty-four months. Visibly reduced seizures were seen in three patients. It was proved by this study that the Atkins diet probably plays a role in the treatment of medically resistant epilepsy.

The first-ever formal study was designed for children suffering from refractory epilepsy. This study was funded by the Dr. Robert Atkins Foundation. From September 2003 till May 2005, 20 children were treated. 16 of them completed the six-month trial. Using the intention to treat analysis, 13 of the 20 children had N50% seizure reduction. The best of them had an N90% improvement in 6 months. The results of this study were similar to most studies of the ketogenic diet. An interesting fact is that although large urinary ketosis present in the first month was correlated with success, it did not persist in 3 and 6 months. This might suggest that strict adherence to the Atkins diet may improve potency during the first month. Yet again, this needs to be confirmed by other studies. It is not proven that the

Atkins diet is better than other diets for people to stay strong. Despite the admiration of this diet and its recognizable success among various people, the evidence in support of this diet is not enough. Although the Atkins diet claims weight reduction without hunger in the short term, the long-term effects of this diet are still unknown. Those who want to try the AD should be told that the short-term use of this diet is safer for weight loss. Those who want to reduce weight should permanently move to a diet that has produced calories and fat and combine it with physical activity so that it also reduces the occurrence of type 2 diabetes and re-infarction between individuals with higher risk (Auvin, 2012; Grooms *et al.*, 2011; Kossoff *et al.*, 2010; Sharma *et al.*, 2012; Sharma *et al.*, 2012).

Side effects

The modified Atkins diet appears to be tolerable with very restricted harmful effects in various studies to date. A 25-50mg/dl rise in total cholesterol was noticeable in the John Hopkins pediatric as well as in adult surveys. It also incorporated a rise in LDL cholesterol. In the adult study, triglycerides were not increased. Blood urea nitrogen (BUN) was the only other significant abnormality found, which was most likely an outcome of increased intake of protein, and serum creatinine did not fluctuate.

Weight reduction can happen in overweight youngsters and grown-ups. Although the modified Atkins diet is little confining as compared to the ketogenic diet, it is still not easy to maintain it. Unlike the ketogenic diet, the long-term after-effects of MAD are yet to be known. Considering that the fat and protein intake is increased, one can suspect the issues like growth impairment, dyslipidemia, kidney stones as well as gastroesophageal reflux disease or GERD will be less as compared to the ketogenic diet. If this is ever signified in future long-term studies, it might be logical to switch the young ones on the KD to the modified Atkins diet (Kossoff *et al.*, 2013; Sharma *et al.*, 2012; Smith *et al.*, 2011).

Ketogenic diet

The ketogenic diet was introduced in the early 1920s to treat seizures, consisted of high fat, low protein,

and a low carbohydrate diet. In the 1970s, it became popular for the treatment of obesity. There is some proof that backs up the use of the ketogenic diet in improving metabolic pathways and increased health effects (Paoli *et al.*, 2013).

The supporter of ketogenic diets gives priority to the restriction of carbohydrates than to fats. Meals consisting of high carbohydrate food causes an increase in blood glucose, insulin and triglyceride levels and decrease high-density lipoprotein cholesterol. An increase in insulin levels obstructs the release of serotonin in the brain, which leads to a reduction in satiety. Reduced carbohydrate intake leads to ketosis which specifies fat utilization. Ketogenic diet concluded in low blood glucose and insulin levels and suppression of appetite. This improves weight and body fat reduction (Joshi and Mohan, 2018).

Mechanism

The significant processes occurring in the ketogenic diet are ketogenesis and ketolysis. The first step involves ketone bodies production in liver cells by oxidizing fatty acids, this happens when glucose is depleted in blood. These are then transported through the blood to other organs to fulfill the energy requirements of cells in the body. The second step, ketolysis, involves the breakdown of ketone bodies (Aziz and Rehman, 2019; Vidali *et al.*, 2015). Fig. 2 depicts the mechanism of the Ketogenic diet.

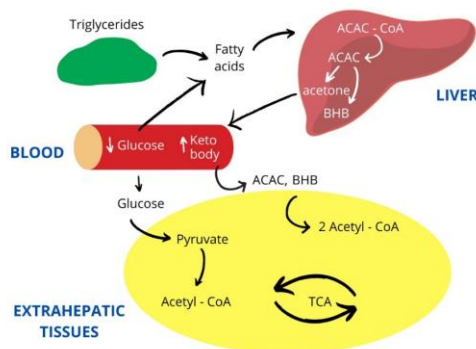


Fig. 2. Low glucose levels in blood leads to increased rate of fatty acid conversion into the three ketone bodies in the liver cells. ACAC and BHB are converted to acetyl-CoA after their transferal to the extrahepatic tissues. Acetyl-CoA is then used as a fuel by TCA cycle to produce ATP.

In the initial stages of the ketogenic diet, water loss is the cause for weight loss, there is little distinction in protein or fat loss if we compare ketogenic and non-ketogenic diets (Dehghan *et al.*, 2017). After some time on a ketogenic diet (intake of carbs less than 50 g per day) glucose stores became inadequate to oxidize fat normally and supply glucose to CNS (CNS relies on glucose as its primary source of energy). After 3-4 days on a ketogenic diet, the center nervous system is enforced to utilize some other energy source- derived from acetyl coenzyme A. In prolonged fasting, this diet accompanies the formation of more than usual ketone bodies – a process called ketogenesis. Ketone bodies are then utilized by body tissues as an energy source, they make more energy compared to glucose due to metabolic effects of ketosis (Paoli *et al.*, 2013).

Is the ketogenic diet effective?

There is strong evidence of weight loss by ketogenic diet but there are different theories on how this mechanism works. According to some researchers, weight reduction results from a reduction in calorie consumption and not because of any metabolic changes (Westerterp-Plantenga *et al.*, 2009). A hypothesis on the metabolic advantage that plays an important role in weight loss is also proposed (Feinman and Fine, 2007). According to the department of agriculture, diets that lead to a reduction in calories result in prominent weight loss regardless of macronutrient composition (Freedman *et al.*, 2001). Compares to these aspects, ad-libitum studies indicate that following a ketogenic diet resulted in increased weight loss during first six months in subjects as compared to a balanced diet (Brehm *et al.*, 2003; Gardner *et al.*, 2007; Shai *et al.*, 2008). A more valid justification for increase in losing weight is the role of ketosis in appetite suppressing action. Evidence suggest direct action of ketone bodies on hormone levels which effects appetite, such as ghrelin and leptin (Sumithran *et al.*, 2013). The mechanism for weight reduction in ketogenic diet involves reduced appetite, reduced lipogenesis, an increase in lipolysis, and an increase in metabolic cost of gluconeogenesis and the thermic effect of proteins. Davison and colleagues *et al.* suggested that ketones

are the protection for cognitive impairment for obesity (Feinman *et al.*, 2015). One of the productive and prominently observed tools for weight loss is very-low-calorie ketogenic diets. In an observational study it was found that under the administration of healthcare workers, VLCKD is safe and successful for weight reduction management in obese individuals, which includes those who are suffering from mild kidney failure. (Bruci *et al.*, 2020) In studies, it is seen that KD puts a positive mood on overweight people (Davidson *et al.*, 2013) and reduces the negative effects on mood of obese serotonin and dopamine which are anxiety and depression neurotransmitter have alteration in their levels. 12- Week ketogenic diet has a positive effect on losing weight without any negative effects on physiology and psychology or metabolic parameters (Dahlin *et al.*, 2012).

According to Bistran *et al.* there was a cutback in the utilization of insulin and a significant weight reduction in type II diabetes mellitus patients who were fed a ketogenic diet. In a recent study, Boden *et al.* Performed a study on obese type II diabetic individuals who were fed a ketogenic diet for some time. Plasma glucose levels reduced from 7.5 to 6.3mol/l and there was an impressive improvement in insulin sensitivity. Some studies suggest the long-term effectiveness of the ketogenic diet in dealing with the issue of type II diabetes. A suggested mechanism for ketogenic diet in type II diabetes mellitus includes: reduced levels of insulin in the blood, increased mitochondriogenesis, and reversed hepatic insulin resistance (Paoli *et al.*, 2013).

Recent studies suggest that the reduction of carbohydrates leading to ketogenesis can cause prominent benefits in the blood lipid profile (Veech, 2004) (Shai *et al.*, 2008). There have been proofs of improvement in the size and volume of low-density lipoprotein-cholesterol substances, decreasing the possibility of cardiovascular diseases, by ketogenic diets. There is some emerging evidence that supports the impact of a ketogenic diet on acne, PCOS, neurological diseases, and cancer. However, the extent of these benefits is still largely hypothetical and uncertain (Paoli *et al.*, 2013).

Adverse effects of the ketogenic diet

Although the ketogenic diet is efficacious in the management of epilepsy, it has some side effects too. It has a lower content of certain minerals, vitamins, and trace elements, one of them being selenium. The RDA for selenium is 30mcg for the age group (4–8 years). Seafood and meat have the highest content of selenium whereas the ketogenic diet was established mainly on the consumption of fat which shown to be inadequate to meet the needs for selenium at times. Nevertheless, the present-day formulas for ketogenic diet meet the recommended dietary allowance of the selenium according to current U.S. requirements.

Antioxidant, Glutathione peroxidase enzyme has selenium as an indispensable cofactor, which eliminates H₂O₂ and detrimental lipid hydroperoxides produced from O₂ derived specie *in vivo*. Consequently, it helps to remove free radicals from the body and inhibit the tissue damage caused by oxidative stress. Thus, the underlying inadequacy of selenium will escalate the free radicals, which are virulent to heart muscle cells. Patient on a ketogenic diet have prolonged QTc interval, rapid heartbeat, changes in the ST-T wave, and the heart stops beating abruptly, approximately 66 individuals have been reported with selenium deficiency who were on a ketogenic diet, selenium associated cardiomyopathy in two of these patients and sudden cardiac death in another two (Arslan *et al.*, 2017).

Supplementation has appeared to be efficacious to improve cardiac function in cardiomyopathy related to selenium deficiency (Sirikonda *et al.*, 2012).

Published reports proposed abnormalities like dyslipidemia, as one of the most well-cited biochemical side effects in individuals following the ketogenic diet. Approximately 12% of children probably on the ketogenic diet had suffered from dyslipidemia (Cai *et al.*, 2017). Reduced serum 25-hydroxyvitamin D concentration and reduced bone has been shown in individuals following the ketogenic diet and was solely on antiepileptic drug therapy (Christodoulides *et al.*, 2012). In another study, it was found that 25-hydroxyvitamin D levels improve at

first at the beginning of a ketogenic diet, including supplementation, but to diminish after three months (Schoeler *et al.*, 2020).

Studies claim that a ketogenic diet could adversely affect glucose metabolism but after conducting research on glucose load instantly, following the cessation of the ketogenic diet, they found that there would be an increased glucose sensitivity after a duration of very low carbohydrate diet and for this reason, it is preferable to have transition phase from the ketogenic diet to a normal diet (Bielohuby *et al.*, 2013; Paoli, 2014). The ketogenic diet has also shown to affect the metabolism of bones. Evidence shows that very long-term intake of the ketogenic diet in children with unmanageable epilepsy may progressively lead to a reduction in mineral content of the bone (Gower and Casazza, 2013).

Evaluation of low carb diets

Atkins diet (i.e. the low carb and high fat prototype diet) has its self-upkeep phase diet plan, which promotes the addition of "healthy" carbohydrates into the diet. There are a few, if any, large and randomized controlled trial studies over one year that shows a 10% weight loss and continuation. (Grief and Miranda, 2010). One research manifested a very low-calorie diet (i.e. only about 800 calories per day) did not surpass an autonomous dietary approach for assessing weight reduction. Atkins' diet was also linked to elevated total cholesterol and LDL cholesterol, as well as elevated saturated fat intake, which was negatively related to endothelial function. It has also been reported that CHO diets are not compatible with a healthy and palatable diet (Chen and Kossoff, 2012; Kossoff *et al.*, 2010).

The conventional "classic" ketogenic diet provides a fixed amount of fat to be coupled with carbs and protein by weight. This is attained by the exclusion of high-carbohydrate foods from the diet and inclusion of high-fat foods. The traditional diet is often initiated in a hospital setting in infants and young children. Most of the dietary fat is made up of molecules called long-chain triglycerides. Even so, medium-chain triglycerides of octanoic and decanoic acids generate

more ketones per unit of energy (Hong *et al.*, 2010; Klein *et al.*, 2010). Conventional KD has far more tolerability issues than modified versions. The "too permissive nature" of the conventional diet is felt to be a likely cause for discontinuing the diet. Acute adverse effects that may change dynamically after the diet starts are nausea, vomiting, hypoglycemia, excessive ketosis and acidosis, and lethargy. Infants and young children who are unable to ensure proper caloric intake and have frequent vomiting are more prone to hypoglycemia.

The most common reason for initial discontinuation is intolerance due to gastrointestinal side effects. Severe conditions include renal stones due to higher urinary calcium/creatinine ratio, cardiomyopathy due to combination acidosis and selenium insufficiency, growth retardation, losing weight, anorexia, progressive loss of bone mineral content, constipation, high cholesterol levels, low albumin and carnitine levels, greater chances of infection, Specific vitamin and/or mineral deficiencies (e.g. selenium) (Dhamija *et al.*, 2013; Kang *et al.*, 2011). In any case, low carbohydrate diets are probably not going to create huge prolonged haul weight reduction and may lead to health issues indicated by various investigations. The alert of driving clinical and nutritional institutions worldwide against all low starch slims down stems from the way that these weight control plans enormously increment fat and protein utilization, which could lead towards numerous sick impacts, and incredibly limit utilization of necessary nutrients: minerals, trace elements, and nutrients, and fiber—all of which encourage improved health and help in the prevention of diseases (Kossoff *et al.*, 2013; Yang and Van Itallie).

High protein diet

Protein-rich diets are the diets where the protein utilization exceeds the prevailing recommendation and it is mixed with low or the moderate intake of the Carbohydrates. The distribution of these macronutrients is the reflection of the eating habits of the most American population. Although, these high protein diets mostly focus on addition or omission of some of the particular food varieties and intake of food

in distinct patterns of diet. Theoretically, the advantage of high protein consumption for weight management involves both of the benefits of protein, increasing satiety and a greater and better accretion in the process of thermogenesis after intake of protein (Westerterp-Plantenga *et al.*, 1999; Westerterp *et al.*, 1999).

Zone diet

One of the most famous diets; The Zone diet, implies that the human body has a natural mechanism to operate immaculately, immediately upon ingestion of a specific amount of macronutrients. Through the consumption of that specific amount, the secretion of insulin is made efficient, that directs towards an eicosanoid metabolism and eventually provides a multitude of biological episodes that lead to a cutback in the possibility and exposure of chronic diseases, enhanced immunity, a high mental as well as physical activity, and better management of weight loss. There is less evidence in science for the connection among the fad diet, eicosanoid metabolism, and endocrinology. This diet prescribes an intake of 30% protein, 30% fat, and 40% carbohydrate. Lean sources of protein and fruits and vegetables as sources of carbohydrates are recommended, whilst most of the coarser grain sources and fruits and vegetables with high glycemic index are avoided and discouraged. Altogether the composition of nutrients in this diet might not vary significantly from the native diet of many. The requirement to intake the accurate macronutrient amount in the dietary pattern might not be feasible. It includes three meals of 500 kcal and the addition of a 100kcal of a snack recommended (Titchenal *et al.*, 1997).

The peculiar health interests of this Zone Diet explicitly consist of, and are not confined to, avoidance of chronic diseases, permanent weight loss, increased and better immunity, high physical and mental activity and also greater endurance and longevity. The Zone Diet claims of the highest physical performance have been rebutted as well as refuted. The Zone is not about caloric thinking but hormonal thinking. The welfare of managing insulin in the Zone Diet is urgent and effective because the sugar level in the blood is also automatically stabilized.

As the brain is constantly being supplied with energy, it results in, less hunger, less fatigue, mental alertness, and feeling energetic throughout the day. Crankiness and mood swings between meals will be reduced because of the absence of low sugar levels that cause tiredness, hunger, and irritability (Sears, 2017).

Evaluation of high protein diet

Published evidence of the Zone diet against a high carbohydrate and a diet that is low in fat. Both groups had the same amount of weight loss. However, in the one which on the side of zone diet, there was no significance in the loss of lean body mass, on the other hand in the batch with higher Carbohydrate levels there was an eloquent loss of 0.9 kilograms to be seen. Two trials have compared side by side of the diets composed of Carbohydrate 45% the protein intake being 25% and fat being 30% with the other group consisting diets of Carbohydrate 58% protein being 12% and fat being 30%. In another attempt, the people were given 80% of basal energy expenditure for about 4 weeks with any of the diets mentioned.

The ones experiencing the diets that were low in carbohydrates significantly had greater weight loss. However, these participants had a loss of excess body water and the collection of the data that was provided was not enough to examine whether the body water was lost disproportionately to body weight. In this case, excess water loss could be explained.

The glucose, insulin, and fat changes were reported in these attempts and they don't provide any eloquent advantages to any of these diets but the results that were drawn are restricted by the attempts short term nature and the inadequate measurements that took place when body weight had been normalized. Thus, brief attempts of higher protein and low carbohydrate intakes provide some advantages in weight loss but there are further trials required (Baba *et al.*, 1999; Kern *et al.*, 1998; Skov *et al.*, 1999).

There is substantial controversy related to the risk associated with high protein intake especially related to problems related to bones and the proper function of the kidneys. High protein consumption is

associated with high excretion of calcium in the urine. But effects on problems related to bone fracture in the long term run and including their risk are not certain. Mechanisms show that calcium in urine induced by protein leads to the increase in the acid load that is also brought about by protein and complex calcium including sulfate and phosphate. Diets high in plant protein do not increase calcium in urine probably because the plant sources of protein have an alkaline potential and they have a lower intake of amino acids that consist of sulfur in them.

Diet high in protein and less carbohydrate consumption creates acidosis that is on a subclinical level and it consists of an increased amount of urea nitrogen level and uric acid in the blood. It results in urine acidification, hyperuricosuria, and urine that is rich in the amount of calcium. High protein diets affect the patients that have conditions like coronary artery disease involving the development of diabetic nephropathy, aggravation of gouty diathesis, accelerated circulation of fatty acids, and it also causes a fluctuation in the levels of low-density lipoproteins and cholesterol. Some reports have the investigation that describes the association between the excess formation of oxalate stones and the high consumption of protein that is probably enhanced by increased metabolism of glycine in the body.

However, these are some of the attempts that have been performed to show the association of increasing stone formation and consistent excretion of high levels of glycolate and oxalate (Paoli, 2014).

Low-fat diet

Diets having 15% of energy from fat are known as low-fat diets. At the initial stage, they were made for delaying and curing cardiovascular diseases. Recently, they have gained everyone's attention in the management of weight. Low energy density foods come under the list of this type of diet. Mainly fruits and vegetables that are high in fiber are included along with legumes and low animal protein food. Rich and refined carbohydrates can also be included along with high contents of lean protein. Food that is high in sugar, dairy that is high in fat is the non-

recommended sources. Dietary supplements can be recommended (Lichtenstein and Van Horn, 1998).

Eat more, weigh less

The major aim of Eat More, Weigh Less is the treatment of coronary artery disease. They reduce serum triglyceride cholesterol, LDL levels specifically and are supposed to lower the possibility of cardiovascular diseases. A study suggested that due to the consumption of low-fat diet, a diet free of omega 3 fatty acid provided amazingly increased bioavailability this finding offered a probable therapeutic advantage of omega-3 free fatty acid formation for the management of extreme hypertriglyceridemia as these patients are advised to stick to the low-fat diet (Davidson *et al.*, 2012).

Is Low-fat diet effective?

According to some studies, that lasted from 21 days to 1 year; showed a reduction in fat level to 10% of kcalories and low-density lipoprotein levels. (Ornish *et al.*, 1998) Schaefer *et al* stated that utilization of a low-fat diet for weight loss treatment significantly decreased plasma total cholesterol, low-density lipoprotein, and high-density lipoprotein (entailed change, 212.5%, 217.1%, and 222.8%, correspondingly). The main attribution to variations in blood lipids might be due to weight reduction, increased intake of fiber, and reduced fat intake (Schaefer *et al.*, 1995).

Plant-based foods, low energy-dense foods are the foundation leading to increased satiety when there is a low intake of energy as compared to high-fat foods. It was presented by Ornish that the basic assistance of converting dietary fat to our body fat, in contrast to carbohydrates and proteins means that all calories are not the same (Ornish and Group, 1998). As the portion intake of fat in the US diet has lessened to 25%, so the spread of diabetes and obesity increased leaps and bounds. Understanding the indication that eating refined and processed carbohydrates that include refined pasta, refined bread, white rice, sugary drinks, and not only fat has put up proudly to the epidemics (Ludwig, 2016). Low-fat diet aids in the reduction of HbA1c and weight.

Low fat diet supported higher depletion in the requirement of medication of diabetes. Improvement in blood lipid profile and diurnal firmness of blood glucose is also seen in various studies along with no potential harmful effects on kidneys that explain considerable management of type 2 diabetes (Tay *et al.*, 2018).

For reduction or elimination of antihypertensive medicines in patients, low-fat diets along with physical exercise are used (Barnard *et al.*, 1983). Improvement seen may be due to changes in dietary habits, the exercise of weight reduction (Wadden and Foster, 2000). A low-fat diet with alternate-day fasting is evidenced to improve brachial-artery flow-mediated dilation. Refinement in flow-mediated dilation with alternate-day fasting can only take place with reduced-fat diets (Klempel *et al.*, 2013). Promising findings indicate that alternate day fasting along with a reduced-fat diet that is 25% of calories from fat, lessens a person's body weight by 5% after 8 weeks of incorporating low-fat diet (Bhutani *et al.*, 2013). Control in weight and reduced use of insulin was seen in patients of type 2 diabetes after using low-fat diets along accompanied by physical exercise (Barnard, 1991). In some studies, results of low fat and high carb diet along with physical activity was seen in hypertensive patients (Barnard *et al.*, 1983).

Adverse Effects

Some studies mentioned problems that occurred due to adapting these types of foods just because of the amount of prohibited eating dietary items, which include limited tastiness (Ornish and Omish, 1993). A small number of unfavorable properties of less-fatty foods are noticed. Barnard *et al* noted an early rise within flatus that normally subsides. None extra unfavorable metabolic or habitual changes were noticed. Extrapolation to the universal inhabitants starting from provoked persons e.g., those having cardiac ailment is doubtful the self-governing properties of weight reduction, exercise associated with daily life involvement makes difficult analysis. The AHA's Science Advisory suggests individuals evade low-fat foods who have insulin-dependent diabetes mellitus, increased triglycerides amount, & impaired absorption of carbohydrates (Lichtenstein

and Van Horn, 1998). Low-Fat diets consist of many carbohydrates nearly (70% to 80%), which encourages daily routine workout. Till now no major adverse impact on physical movement has been noticed in persons consuming this diet. Ornish *et al* studied zero main dissimilarity in the work out period or occurrence in persons following these diets, though they do report an important enlargement in exercise strength (Ornish and Group, 1998).

Evaluation of Low-Fat Diets

Trying these eating patterns include comprehensive involvement employing physical activity, diet, and stress management mechanism. In the standard of living cardiac examination, cardiovascular blood vessel complications persons consumed a diet that was a less-fatty vegan eating habit and involved in modest aerobic physical activity including deliberation, or a balanced eating plan having fat nearly 25%. In the primary year, people who were consuming a low-fatty diet reduce 11 kilograms comparatively gain of 1 kilogram in control, & through 5 years people having a low-fatty diet maintained a six kilograms reduction comparative with a persistent 1-kilogram increase in reins. Following 1-year, major change within people was noticed for total and Low-Density Lipoprotein cholesterol with accumulation to mass, within five years, just the mass variation kept significant. None of the main changes within management people were seen for HDL cholesterol and triglycerides. Despite the result in the standard of living cardiac examination, a rise in triglycerides and reduction in High-Density lipoprotein cholesterol were experiential using less-fatty eating patterns thus changeable entity vulnerability derives in the direction of these changes. Rising carbohydrates expenditure can consequence in enlarged absorptions of triglyceride & minute intense Low-Density Lipoprotein, mutually which might result in atherogenesis (Joshi and Mohan, 2018).

Intermittent fasting

Various energy or caloric restriction methods (i.e. intermittent fasting, routine periodic fasting, and alternate day fasting or intermittent energy restriction) have become the latest weight loss fad.

These methods involve the intermixing of normal daily intake of calories with a severe restriction of calories/fasting for a short period. A recent 5:2 strategy has been produced in which 2 days of a week are classified as “fasting days” (with the consumption of 600 calories for men and less than 500 calories for women). This approach has been shown to be more effective for weight loss and improved insulin sensitivity than continuous modest restriction of calories (Anson *et al.*, 2003; Hietaniemi *et al.*, 2009; Horne *et al.*, 2015; Rizza *et al.*, 2014).

Intermittent fasting, that is a period of ingesting less amount of foods and caloric drinks. It usually lasts from up to 12 hours to 3 weeks. It is an old practice that people have been following in various globally (Antoni *et al.*, 2016). Any Fasting has a potential impact to affect human behaviors. The three most popular ways of intermittent fasting include fasting for the entire day, alternate fasting, and time-restricted fasting. Alternate day fasting includes taking mostly a single meal that comprises of 25% of energy. Fasting for a whole day includes fasting for two days and then eating on other days. It allows taking 25% of the energy of the total energy (Brown *et al.*, 2013). Time-restricted fasting includes fasting at the same time each day with one window for eating food and the remaining not to eat any. (Rothschild *et al.*, 2014) A study done on eight overweight adults showed that their fasting more than 14 hours decreased their intake of calories as well as led to weight loss. Therefore, contributing to improving their moods, satisfaction levels, and satiety levels while going to bed has been increased. (Gill and Panda, 2015).

Mechanism

In mammals, the liver is the main organ that works as a store for glucose. Glucose is reserved in the form of glycogen in the body. The human body depending on the level of the physical activity and 12-24 hours of fasting usually concludes in more than or 20% decrease in the levels of serum glucose accompanied by the depletion of hepatic glycogen. This accompanies to a switch in the metabolic process in which fat-derived ketone bodies, free fatty acids, and

non-hepatic glucose are utilized as energy source. Although most tissues in the body can utilize fatty acids as a source of energy whenever in prolonged fasting but the brain then relies on ketone bodies acetoacetate and beta-hydroxybutyrate accompanying glucose for the consumption of energy. Ketone bodies are produced in the hepatocytes as a result of acetyl-CoA being generated from the beta-oxidation by a process of conversion of the ketogenic amino acids and also by the release of the fatty acids into the bloodstream by adipocytes. After the depletion of hepatic glycogen, fat-derived glycerol including the amino acids and ketone bodies account for the gluconeogenesis dependent production of 80 g/day glucose approximately that is most commonly utilized in the human brain. It is depending on the composition and the body weight, gluconeogenesis also the free fatty acids, and the ketone bodies allow most humans to survive thirty or more than those days without the presence of food (Longo and Mattson, 2014; Patterson and Sears, 2017).

Tissue-specific effects of intermittent fasting

Studies have shown the biotic effects of intermittent fasting on tissues that are directly related to cardiovascular and metabolic health of an individual, which can be seen in Fig.3. Various researches on humans and animals have indicated that intermittent fasting improves the efficiency of metabolism while reducing oxidative stress. The short duration of fasting is likely to activate ectopic triacylglycerides in non-adipose depots, thus causing a reduction in the harmful impacts of deposition of triacylglycerides inside the liver and muscle cells and reallocating triacylglycerides into adipose tissue (Lignot and LeMaho, 2012; Wan *et al.*, 2010).

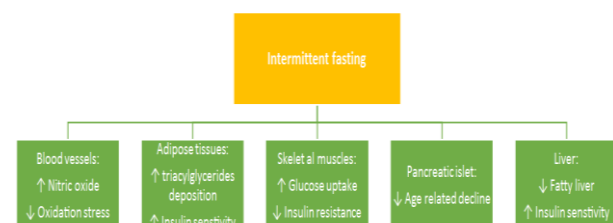


Fig. 3. Tissue specific effect of intermittent fasting on cardiovascular and metabolic health.

Is intermittent fasting effective?

Experiments on animals have suggested that intermittent fasting has also cardioprotective benefits (Brown, 2012). It increases the amount of the adipokine adiponectin, an exclusive adipokine that has useful effects but negatively interrelated with body composition due to its circulating levels (Davies and Efthimiou, 2012; Kroeger *et al.*, 2012). Despite that the levels of visceral fat and various additional adipokines, such as leptin, IL-6, TNF and IGF-1 are regulated by intermittent fasting (Birkenhäger *et al.*, 1968). All these changes cause reduced LDL-C and TC, thus reducing the risk of cardiovascular diseases. Intermittent fasting appears to be a beneficial approach for the treatment of unmanageable obesity, and for the individuals who have BMI greater than 40kg/m² (Ball *et al.*, 1970). Treatment focus on intermittent starving as opposite to calories restriction (Klempel *et al.*, 2012). Regardless of the strict nature of intermittent fasting during the fasting days, it has a generally good compliance record and the body weights of obese individuals have been remarkably reduced. As obesity is frequently associated with type- II diabetes, hence most individuals are assigned to lifestyle interventions aimed to reduce weight. Evidence suggests that in obese individuals, the development of type- II diabetes may be slow. The latest study validates that with daily caloric restriction, type- II diabetes was reversed and the improvement in the pancreatic function and reduction in the deposition of occult triglyceride was also seen (Halberg *et al.*, 2005; Lim *et al.*, 2011). The particular diet involves the consumption of maximum 600 kcalories each day, that may be too critical for most type- II diabetics, but this approach can still improve metabolic parameters and is more sustainable, insulin levels and insulin sensitivity (Tikoo *et al.*, 2007) and avoid the occurrence of problems caused by diabetes (Jane *et al.*, 2015).

Adverse effects

The BDA suggests that quick weight loss because of the fasting may greatly be associated with the water and glycogen loss instead of fat, which may lead to dizziness, fatigue, and low energy levels. Intermittent fasting leads to the development of diabetes, obesity,

cancer, and cardiovascular disease by disturbing metabolic processes such as circadian biology, the Gastrointestinal Microbiota, and regulating daily life activities (Jane *et al.*, 2015; Longo and Mattson, 2014). During intermittent fasting overall energy consumption is decreased because it reduces the entire time present for the consumption of food, this causes alternation in appetite modifiable hormones (Leptin, ghrelin, xenin) that raises the overall energy consumption and develops the risk of obesity (Schiavo-Cardozo *et al.*, 2013; Wirth *et al.*, 2014). Many functions of the gastrointestinal tract demonstrate healthy circadian or sleep-wake rhythms. Some functions are much greater during the daytime such as gastric emptying, blood flow, and metabolic response to glucose load as compared to the night. Night time eating reduces sleep period and deprived sleep features (Antelmi *et al.*, 2014; Yamaguchi *et al.*, 2013) which leads to insulin resistance and triggers the threat of obesity, diabetes, CVD and cancer (Ford *et al.*, 2014). Ingestion of meal on irregular circadian time can desynchronize circadian profile and this chronically altered cycle is believed to affect Gastrointestinal function impairs metabolism, normal sleep pattern and health (Ekmekcioglu and Touitou, 2011). Intermittent fasting may openly manipulate the gut microbiota, which is the multifaceted, varied, and immense microbial society that lives in the intestinal tract. Various studies recommend that alternations in the formation and metabolic activity of the gut microbiota in overweight persons might permit an “obese microbiota” to yield extra power from the diet than a “lean Microbiota” and thus manipulate total energy incorporation, outflow, and storehouse (Ridaura *et al.*, 2013; Tilg and Kaser, 2011). Fatness-linked alternation in gut microbiota might modify gut permeability and bacterial translocation to endorse complete soreness, a feature of fatness and fatness-linked disorders (Shen *et al.*, 2013).

Eat right for your type

Diets of the ABO blood group system are being prompted from the last few decades as they are advised to individuals according to improve and decrease the risk of some diseases (Lewis, 1985).

In scientific literature, the blood types are not giving any effective evidence but in some studies the association 'between' blood type based pattern whether the individual's ABO genotype has modified any association (Freed, 1999). Table 1 shows the recommended diets according to blood type. Dietary habits of ancestors are revealed by the ABO blood group and taking a specific diet for blood group. Group O is well known as the ancestral blood group. The diet should be high in animal protein this diet is also known as the hunter-gatherer era. Whereas blood group A should take a vegetarian diet. In agrarian societies, a human settlement was believed in the blood group type (Freed, 1999; Lewis, 1985;

Wang *et al.*, 2014). The classification of the ABO blood group is based on the variation of some carbohydrate antigen substances on red blood cells. First recognized a genetic variation in humans, the ABO blood group has an extensive study for association with a variety of diseases which includes cancer, malaria, and cholera. In accordance with cardiometabolic disease person with blood group, O had a lower level of Von Willebrand factor (VWF) has reduced the risk of venous thromboembolism compared to blood group. Group b have low levels of E-selection and decreases the level of type-2 diabetes to group O (Aird *et al.*, 1953; Rowe *et al.*, 2007; Wolpin *et al.*, 2010).

Table 1. Recommended diet according to different blood group types.

Type of blood	Recommended diet
Type O	A high protein diet like meat, fish poultry, vegetables, dairy, and some supplements
Type A	A meat-free diet only some fruits, vegetables, whole grain organic, and fresh food they have a mostly sensitive immune system.
Type B	Avoid corn, wheat, lentils, and peanuts, encourage eating vegetables, eggs, meat.
Type AB	Focus on tofu, seafood, and dairy Avoid caffeine, alcohol

Is this diet effective?

Blood plays a major role in the presence or absence of certain antigens in the human body. The ABO blood group system plays important role in a person's susceptibility to some diseases. They protect from cardiovascular diseases, some types of cancers. Leila Cusack conducted a study whose main focus was data presentation related to blood types on published studies, some diets were critically appraised by use of assessment development and evaluation (Freed, 1999; Rowe *et al.*, 2007; Wolpin *et al.*, 2010). A study conducted by Gordon shows that the major advantage of ABO blood type was donor identity was found very easily in adults and for first grades. As in past Personality traits were difficult to find this diet made it easier to find.

Adverse effects of ABO blood type

Blood type diet was not recommended to be used for commercial purposes and does not support the valid evidence of health benefits. They do not have commercial applications. This diet eliminates some categories of food which can cause deficiencies of some minerals and vitamins so, it requires some dietary supplements with diet (Wang *et al.*, 2014).

Evaluation of this diet

The blood type diets are associated with some specific risk factors in young children, but it is not related to one's ABO blood group, the first study done on blood diet types and biomarkers of cardiometabolic health. The increased consumption or over eating of fruits and vegetables is in type a diet which is an association of adherence and favorable cardiometabolic risk. The low consumption of meat and poultry is recommended by health agencies.

The type AB diet is favorable for some risk factors, but some dairy and poultry are recommended (Freed, 1999). This differences in these diets shows the favorable cardiometabolic profile which was adhered to type AB and type B diet. Type O low carbohydrate diet which may show the adherence to the diet shows association with low serum triglycerides which were known as low carbohydrate diet the reduction of triglycerides production in the liver or increasing cellular uptake of low carb intake. Certain biomarkers affect the favorable association of ABO genotype which was found in type A, AB, and O sharing same diet adherence matched blood group and unmatched

blood group was compared they have no significant effect observed on diet. Testing the validity of the blood type diet shows the adherence to a specific diet with a favorable cardiometabolic disease profile. These diets reflect eating habits the observation was independent of the ABO blood group. (Wang *et al.*, 2014) Blood type diet was not recommended to be used for commercial purposes and does not support the valid evidence of health benefits (Aird *et al.*, 1953; Chandra and Gupta, 2012; Liunbruno and Franchini, 2013).

Various analysts likewise recommend that there might be changes in the relationship in diet and pathways of the digestion as a result of ABO blood gathering. For example, an investigation was done on high fat based eating plans, and levels of intestinal phosphatase demonstrated that a few people having a blood group not simply have the most minimal phosphatase movement in the body yet also had a minimal increment in working subsequent to eating a high fat eating routine. This is on the grounds that adversely phosphatase directs the assimilation of fat in the gut (Lallès, 2010). This might be clarified how people with A blood group had more significant of serum cholesterol levels (He *et al.*, 2012). Recent investigations have demonstrated that group of ABO blood may affect supplement preparing by changing the digestion of the gut microbiome of humans. It has been seen that various microscopic organisms are to have unmistakable restricting capacity to antigen of ABO blood (Tremaroli and Bäckhed, 2012). This clarifies why people with antigen B which is blood B group and AB group might have an increased collection of the *Clostridium coccoides*, *Clostridium leptum* and *Eubacterium rectale*. The results of these explores propose that blood group ABO might happen to show a hereditary factor that might change reaction to dietary ingestion. Nevertheless, proof of these connections stay unsure (Mäkivuokko *et al.*, 2012).

Conclusion

In conclusion, fad diet is not beneficial in longterm, it is nutritionally inadequate and should be avoided. Healthy weight loss should be followed by reduced caloric intake and increased physical activity and not with these fads that has so scientific basis and can

cause potential harm. Today's high prevalence of fad diets combined with less absolute and satisfactory results including myths and taboos has helped foster the popularity of fad diets. Popular diet trends and structured diets have a "fixed" dietary balance whereas dietary needs vary from person to person. People may lose their nutrition in the heed of losing weight but the media's perpetuation of fad diets and not stating the facts is never-ending. The history of fad dieting goes back a hundred years ago, it is not a present-day problem. All passions have to be restrained, if not denied, and one should cease to be a slave of nothing but fatal delusions.

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