

Research Paper

Dietary Patterns According To The Different Genetic Blood Groups

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Abstract— The blood is the most essential component of the human body. It accounts for about 8% of a normal human's body. The negative or positive blood groups are A, B, AB, and O (rh). A drop of blood can have an enormous impact on a person's life. One of the other factors that can affect a person's life is nutrition. The concept of tailoring diets to match an individual's genetic blood group has gained attention in recent years. Proponents argue that these personalized diets can optimize health and prevent disease. This paper aims to critically evaluate the scientific evidence supporting the relationship between genetic blood groups and dietary recommendations while emphasizing the importance of evidence-based approaches to healthy eating.

Keywords— Blood Groups, Diets, Healthy Meals.

1. Introduction

The maintenance of general health and the prevention of chronic diseases depend greatly on dietary decisions. Offering individualized diets based on hereditary blood types raises the possibility that a person's ideal dietary needs can be determined by their blood type. The widely accepted blood type diet idea by Dr. Peter J. D'Adamo contends that a person's blood type influences their ability to digest certain foods and has an effect on their overall health.

Prior to 1900, doctors believed all blood, including that of animals, was the same.[1] Dr. Karl Landsteiner eventually began to observe how human blood transfusions may either result in death or maintain patient life. When Landsteiner announced the ABO blood groups to the scientific community in 1909, his work attracted notice. He received the Nobel Prize in Physiology or Medicine in 1930 for this achievement. The O, A, B, and AB blood types, also referred to as the ABO group. The presence or absence of specific antigens on the surface of red blood cells' is used to classify them. There are A antigens in Type A, B antigens in Type B, both antigens in Type AB, and neither antigen in Type O. Antigens found on cells in the body act as identification, much like a passport would for us. There may be millions of different antigens on a single cell, which may either be proteins or sugars. These sugars are ABO antigens.

Other than simply A or B antigens, various additional antigens can be found on a person's RBCs. RBC function

does not appear to be severely influenced by the absence of many of these additional antigens, despite the fact that many of their actions remain unclear. [1] Antigens are beneficial to the body since they aid the immune system in determining whether or not something is unfamiliar. The immune system ignores blood type antigens that are well-known or recognized but responds promptly to alternative signals when necessary.

Blood type is affected by the antigens that are found on a person's red blood cells. Certain antigens are present depending on the traits a person got from their parents. [2] Antigens are merely surface stains on a cell that let the body identify whether or not a cell is alien. The immune system can recognize foreign cells in the body and choose the appropriate course of action by studying how the antigens on foreign cells interact with the cells of the body. Similar to this, the antigens in our blood enable identification.

Each of the four major blood types—A, B, AB, and O—has specific nutritional needs. Blood's primary function in the human body is as a means of transportation. In addition to carrying oxygen and digested nutrients, RBCs also help the body get rid of waste materials like CO₂, urea, and lactic acid. [3] The blood is in charge of absorbing nutrients from digested foods that have broken down. In addition to providing oxygen and nutrients, our blood also serves to clot wounds, transfer waste, fight infection, and maintain homeostasis (the body in an approved range of biological activities). [4]

Despite the fact that blood contains a variety of fascinating components, we will focus on how nutrients in the human body interact with blood and how this affects the different blood types.

Nutrients must first be in a transportable condition for the blood to effectively carry them. The intricate process of digestion enables the body to break down food into simple components that are either consumed or eliminated. [5] As saliva and its enzymes come into contact with food in the mouth, the digestive process starts. Starches start to break down at this point. The food does not break down when it passes through the esophagus and into the stomach during swallowing. As the lower stomach muscle contracts, breaking down proteins, the stomach acids continue to mix with the food. The stomach's contents will slowly exit into the small intestine. The small intestine's villi are where nutrients first enter the bloodstream for absorption. The small intestine's lining contains tiny, finger-like extensions called villi that serve to enhance the surface area of the hollow organ and speed up digestion. The nutrients will be distributed throughout the body by the blood from this point on. Whatever remains after passing through the small intestine is transferred to the large intestine, where water is absorbed to transform the waste into stool.

This paper will inquire into the scientific basis, controversies, and limitations surrounding the concept of providing healthy diets according to different genetic blood groups.

2. Blood Types and Dietary Patterns

Dr. Peter J. D'Adamo pioneered the Blood Type Diet with the publication of his book "Eat Right 4 Your Type" in 1996. This book has been transcribed into 65 different languages and sold over seven million copies worldwide. Nutri Books calls it "one of the ten most influential health books ever written." Dr. Gerhard Uhlenbruck of the University of Cologne praised Dr. D'Adamo as "one of the most creative scientists in the Western world." [6] The 20th Anniversary Edition, which includes new lists and information that reflects how medicine is performed now, was recently published.

2.1. Blood Type O:

The blood type O is thought to be the oldest. According to D'Adamo, it first appeared in Africa around 40,000 BC. Their diet was mostly made up of animal protein. During times of scarcity, the Type O's were forced to eat roots, berries, nuts, and smaller animals. [7]

Lean meats, fish, and vegetables, as well as other high-protein foods, are emphasized in the blood type O diet. Wheat, in particular, should be avoided or consumed in moderation. Regular exercise is also encouraged.

The foods listed in the following tables (1, 2, 3, and 4) are, for the most part, those that are more widely consumed.

Table 1. Food recommended for (O) Type

Category	Highly Beneficial	Neutral	Avoid
Meat/Poultry	Beef, Veal, Venison	Chicken, Turkey	Pork (all)
Seafood	Cod, Rainbow trout, Swordfish, Yellowtail	Crab, Lobster, Oysters, Shrimp, Tuna	Barracuda, Catfish, Smoked, Salmon, Octopus
Eggs/Dairy	None	Chicken egg,cheese (farmer, Feta,Goat, Mozzarella)	Buttermilk, Cheese (American, Blue,Cheddar, Parmesan,Ricotta,Ice cream, Milk (Cow,Goat,Cocunut),Yogurt
Oils/Fat	Flaxseed, Olive oil	Canola, Sesame	Corn syrup, Peanut
Nuts/Seeds	Flaxseed,Pumpkin seed, Walnuts	Almonds, Pecans, Sesame seeds/ butter	Cashew, Peanut & peanut butter, Pistachio
Grains/Breads	Essene bread	Bread (Gluten-free, rice, spelt, soy)	English muffin, Cornmeal, Wheat
Vegetables	Broccoli, Collard greens, Lettuce,Onion, Sweet potato, Spinach, Turnip	Asparagus, Beet, Carrot, Celery, Radish, Squash, Tomato, Zucchini	Cauliflower, Corn, Mustard greens, Black olives, Pickles, Potatoes (non sweet),
Fruits	Banana, Fig, Plum, Prune	Apple, Cranberry, Grape, Grapefruit,Lemon, Lime, Peach, Pear, Pineapple, Strawberry, Watermelon	Blackberry,Cantaloupe,Honeydew melon, Orange, Tangerine

2.2. Blood Type A:

Type O individuals were forced to adapt to dietary changes when they were relocated, leading to the emergence of Type A, which stands for agricultural. The rapid transition from the O type allele to the A type allele was considered to be the result of successive mutations caused by the lifestyle change. Instead of a diet high in animal protein, they were fed animals and cereals. These people are thought to have appeared between 25,000 and 15,000 B.C., "first appearing somewhere in Asia or the Middle East." [7]

A largely plant-based diet, which includes fruits, vegetables, legumes, and whole grains, is advised for blood type A individuals. Red meat and processed foods should be consumed in moderation or not at all. Meditation and other stress-relieving exercises are also encouraged.

Table 2. Food recommended for (A) Type

Category	Highly Beneficial	Neutral	Avoid
Meat/Poultry	None	Chicken, Turkey	Pork, Beef, Lamb, Veal, Venison
Seafood	Cod, Salmon, Sardine, Snail, Trout	Bass, Shark, Swordfish, Tilapia, Tuna	Catfish, Crab, Crayfish, Frog, Lobster, Octopus, Oyster, Shrimp
Eggs/Dairy	Soy milk	Egg (chicken, duck), Cheese (Farmer, Feta, Goat, Mozzarella), Yogurt	Cheese (American, Cheddar, Cottage, Cream), Butter, Ice cream, Cow's milk
Oils/Fat	Flaxseed, Olive oil	Canola oil	Corn, peanut
Nuts/Seeds	Flaxseed, Peanut, Pumpkin seed	Almond (butter, milk), Pecan, Sesame seed & butter, Sunflower seed & butter	Cashew, Pistachio
Grains/Breads	bread, Oat Flour, Soba noodles	Corn muffin, Gluten-free bread, Spelt bread, Rice	English muffin, whole wheat bread
Vegetables	Beet greens, Broccoli, Carrot, Collard, greens, Garlic, Onion, Turnip, Pumpkin, Spinach	Asparagus, Beet, Corn, Brussel sprouts, Squash, Cauliflower, Zucchini, Cucumber, Iceberg, lettuce	Cabbage, Eggplant, Black olives, Peppers, Potatoes, Tomato
Fruits	Blackberry, Blueberry, Cherry, Cranberry, Grapefruit, Lemon, Pineapple, Plum, Prune	Apple, Avocado, Grape, Kiwi, Peach, Pear, Pomegranate, Raspberry, Strawberry, Watermelon	Banana, Coconut, Mango, Honeydew, Melon, Orange, Papaya, Tangerine

2.3. Blood Type B:

Type B, the balanced blood type, This blood type is assumed to have evolved in a subset of the Type O population that moved to the Himalayas, a stark contrast to Africa's hot savannahs. The new blood type group then split, with some people going north into Eastern Europe and the rest going to India and Asia. Because their societies were founded on herding and domestication, they ate a lot of meat and dairy. [7]

A balanced approach, including a range of fruits, vegetables, whole grains, lean proteins, and dairy products, is suggested by the blood type B diet. Processed foods and specific grains like wheat and corn should be limited.

Table 3. Food recommended for (B) Type

Category	Highly Beneficial	Neutral	Avoid
Meat/Poultry	Lamb, Rabbit, Venison	Beef, Turkey, Veal	Pork, Chicken, Duck, Quail
Seafood	Caviar, Sardine, Pickerel, Salmon	Catfish, Squid, Swordfish, Tilapia, Tuna	Anchovy, Bass, Crab, Crayfish, Frog, Lobster, Oyster, Shrimp
Eggs/Dairy	Cheese	Butter, Chicken	Cheese (American,

y	(Cottage, Farmer, Feta, Goat, Mozzarella), Milk (cow, goat), Yogurt	egg, Cheese (Cheddar, Cream, Parmesan, Swiss), Sour cream	Blue, Soy), Ice cream, Egg (duck, goose, quail), Soy milk
Oils/Fat	Olive oil	Flaxseed	Avocado, Canola, Coconut, Corn, Peanut, Sesame
Nuts/Seeds	None	Almond, Pecan, Walnut	Cashew, Hazelnut, Pistachio, Peanut, Pumpkinseed, Sesame, Sunflower
Grains/Breads	Bread (Brown rice), Flour (Oat, Rice, Spelt)	Gluten-free bread, Quinoa, Rice (white, brown, basmati)	Corn muffin, Bread (Gluten, Whole Wheat, Rye), Buckwheat, Couscous
Vegetables	Broccoli, Cabbage, Carrot, Cauliflower, Collard greens, Eggplant, Peppers, Sweet potatoes	Asparagus, Celery, Cucumber, Lettuce, Horseradish, Turnip, Spinach, Mushroom, Squash, Zucchini	Artichoke, Corn, Olive, Pumpkin, Radish, Tomato
Fruits	Cranberry, Grape, Pineapple, Plum, Watermelon	Apple, Blackberry, Peach, Blueberry, Cherry, Pear, Grapefruit, Orange, Lemon, Lime, Mango, Raisin, Strawberry	Coconut, Persimmon, Pomegranate

2.4. Blood Type AB:

AB type stands for modern. It is the least prevalent and the youngest of the four varieties, according to D'Adamo. D'Adamo asserts that it began when Type B Mongolians and Type A Caucasians mixed ten to twelve millennia ago. According to D'Adamo, "Type AB is rarely found in European graves prior to A.D. 900." [7]

Blood type AB is regarded as a blend of A and B, suggesting a varied dietary strategy. It is advised to consume a diversified diet with plenty of fruits, vegetables, whole grains, lean proteins, seafood, a little red meat, and processed carbohydrates. A combination of calming exercises and moderate physical activity is also advised.

Table 4. Food recommended for (AB) Type

Category	Highly Beneficial	Neutral	Avoid
Meat/Poultry	Turkey	Lamb, Liver, Pheasant	Pork, Beef, Chicken, Venison
Seafood	Pickerel, Tuna, Salmon, Sardine	Catfish, Caviar, Scallop, Tilapia	Crab, Crayfish, Eel, Lobster, Oyster, Shrimp
Eggs/Dairy	Cheese (Cottage, Farmer, Feta, Mozzarella), Goat milk, Sour cream	Cheese (Cheddar, Cream, Swiss), Chicken egg, Milk (Almond, Cow, Soy)	Cheese (American, Blue, Parmesan, Provolone), Butter, Ice cream
Oils/Fat	Olive,	Canola, Flaxseed,	Cottonseed,

Nuts/Seeds	Walnut Chestnut, Peanut & Peanut Butter, Walnut	Peanut Almond, Cashew, Macadamia	Sunflower, Sesame Hazelnut, Pumpkin seed, Sesame seed, Sunflower seed
	Grains/ Breads	Bread (Glutenfree, Wholewheat), Cou scous, Flour (gluten, whole wheat), Quinoa	Corn muffins, Kasha
Vegetables	Beet greens, Broccoli, Celery, Cauliflower, Collard greens, Cucumber, Sweet potato	Asparagus, Cabbage, Carrot, Lettuce, Onion, Potato, Spinach, Tomato, Zucchini	Artichoke, Corn, Olive, Pickles, Radishes
	Fruits	Apple, Blackberry, Pear, Blueberry, Lime, Peach, Raisin, Nectarine, Raspberry, Strawberry	Avocado, Banana, Coconut, Mango, Orange, Pomegranate

3. Results and Discussions

Evidence-based dietary guidelines offer thorough and scientifically supported advice for healthy eating, in contrast to the blood type diet. A balanced approach to nutrition is promoted by organizations including the World Health Organization (WHO), the U.S. Department of Agriculture (USDA), and the European Food Safety Authority (EFSA).

From our previous discussion of the digestive process, it is obvious that the stomach is the principal site of food breakdown and that nutrients enter the bloodstream via the villi of the small intestine. This is when lectins come in handy. Lectins are a protein family with binding characteristics that form a type of glue with multiple applications within an organism. [8] Lectins are found in foods, plants, animals, microorganisms, and other living things. Because of their interactions with blood and other bodily cells, they participate in the blood-type diet.

When you consume a food that includes protein lectins that are incompatible with your blood type antigen, the lectins begin to target a certain organ or biological system and begin agglutinating blood cells there, according to D'Adamo. Agglutination, or the clumping of cells, can cause inflammation and other problems in the body. For example, agglutination "can cause cirrhosis in the liver, irritable bowel syndrome in the intestines, or block the flow of blood through the kidneys." [9] Depending on the lectins contained in the meal and how they interact with a person's blood type, different reactions to food may occur during digestion. As the body breaks down the nutrients in food, lectins are crucial to how the body functions. Lectins can be harmful or beneficial to a person's body depending on how they interact with the antigens found in their cells. Toxic lectins cause blood cell agglutination, which slows metabolism and can cause irritation, inflammation, and other negative effects. When

metabolic rates drop, it's because the body is preoccupied with dealing with the clumping of cells.

When metabolic rates slow, it is because the body becomes distracted while dealing with cell clumping. The delayed metabolism induces weight gain because, as agglutination happens, the immune system receives a notice that something is wrong, and until that issue is resolved, the human body will slow down its rate of function to concentrate specifically on this new scenario. [9] If all of the meals one consumes generate scenarios like this in their body, gaining weight is a very likely by-product.

However, a similar mindset can be applied when speaking of healthy lectins as by-products. As previously indicated, lectins can act as a type of biological glue. When used to benefit the body, this adhesive is quite powerful in removing poisonous components that are harmful. The lectins aid the metabolic process in this way since there is no interruption or message sent indicating that something is not as it might be. The body can function equally effectively as intended. In the words of Joseph Christiano, author of Blood Types, Body Types, and You, "eating compatible food for your blood type assists the body in losing weight by eliminating excess toxins that are stored in fat cells, which in turn shrinks the size of your fat cells." He also likens suitable foods to medication, claiming that they "heal and repair bodily functions." [9]

To start with, the major reason anyone should desire to include a diet in their life is to become a healthier person than they were before they began. The blood type diet guarantees health benefits by incorporating more favorable foods and avoiding detrimental ones. Following this diet is likely to result in weight loss. D'Adamo also believes that by adhering to the blood type diet, one can get "Power over disease" such as "aging diseases, allergies, asthma, autoimmune disorders," and even cancer.

The link between blood type and disease is a common issue when addressing blood type and disease. Blood Type Diet supporters and opponents acknowledge that some blood types are more susceptible to cancer than others. Non-O blood groups have a higher risk of cancer of the abdomen than type O, with type A and type B showing a considerable risk. [10] Another study found that people with non-O blood types were more likely to develop pancreatic cancer. [11]

Apart from cardiovascular illnesses, a wide range of COVID-19 comorbidity variables have been identified, some of which may be linked to ABO blood groups. Although many research has been undertaken to look for links between ABO phenotypes and inflammation or autoimmune illnesses, the results have often been contradictory. Nonetheless, some of these relationships were replicated in a recent phenomic investigation encompassing a very large number of patients from independent cohorts. [12] Thus, C-reactive protein and alkaline phosphatase levels seem greater in blood type A individuals compared to blood group O individuals, indicating a more inflammatory state in the former group. Although replication studies are few, blood group O has been

shown to be a protective factor for Crohn's disease, ulcerative colitis, type I diabetes, and multiple sclerosis. [13] ABO blood classes have also been linked to indices of general metabolism. PSK9 levels are higher in non-O blood type people, which is consistent with their higher total cholesterol, LDL-C, and HDL-C levels. [12,14] Blood group A is also linked to a reduced forced vital capacity and volume of forced expiration in 1 s. Although the mechanisms underlying these distinct connections are unknown, they may increase the chance of severe COVID-19 or aggravate the condition. [15,16]

Table 5. Food groups Proportional Guidelines In terms of blood type:

		Type O Protein	Type A Carbs	Type B Mixed	Type AB Mixed
Fruits	&	40%	70%	54%	60%
Vegetables					
Oil		20%	9%	13%	20%
Meat		40%	-	-	-
Meat & dairy		-	Minor	33%	minor
Beans	Nuts&	Minor	21%	Minor	Minor
protein					
Seafood		Minor	Minor	Minor	20%

These suggestions emphasize the significance of eating a mix of vegetables, fruits, whole grains, lean proteins, and beneficial fats while taking individual preferences as well as health concerns into account. They emphasize nutrient sufficiency, portion control, and weight maintenance. Physical activity, along with a well-balanced diet, is emphasized as necessary for general well-being.

4. Conclusion

The concept of providing healthy diets based on genetic blood groups has garnered attention, but the scientific evidence supporting this theory is limited and controversial. While the blood type diet offers specific recommendations, it fails to consider crucial factors and lacks consistent scientific support.

Adopting an evidence-based approach to healthy eating, encompassing balanced nutrition, portion control, and physical activity, is crucial for promoting overall health and preventing chronic diseases. It is advisable to consult with registered dietitians or healthcare professionals who can provide personalized dietary recommendations based on individual needs.

Conflict of Interest

All authors disclose that there are no actual or potential conflicts of interest, including any financial, personal, or other relationships with other people or organizations that could inappropriately influence, or be perceived to influence, their work. Otherwise, Authors declare that they do not have any conflicts of interest.

Authors' Contributions

Author 1 researched literature and conceived the study. Author 2 wrote the first draft of the manuscript. Author 3 is involved in protocol development and data analysis. All

authors reviewed and edited the manuscript and approved the final version of it.

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