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Concept of the absorptive faculty (Quwwat-E-Jazibah) of the body and its inequability: A review

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Abstract

Background: The Unani philosophers described the nutrition, growth and reproductive functions under the head of Afaal-e-Tabiyah, governed by Quwwat-e-Tabiyah (natural faculty) and it is more operational for the anabolic functions. The nutritive functions under this faculty are carried out specifically by the Quwwat-e- Ghaziyah (nutritive faculty) which is subserved by four faculties viz., Quwwat-e-Jazibah (absorptive faculty), Quwwat-e-Masika (retentive faculty), Quwwat-e-Hazima (transformative faculty), Quwwat-e-Dafi'a (eliminative faculty). These four powers are present in each and every cell of the body, mediated through different temperamental qualities. Most of the metabolic disorders result from the malfunctioning of serving powers of Quwwat-e-gaziyah.

Aim: The present review aims at analyzing the concept of Quwwat-e-Jazibah (absorptive faculty) in various aspects as per the classics of Unani Medicine and the diseases caused by immoderation of this faculty, which can be applied in both preventive and therapeutic purpose.

Materials & Methods: The present literary review is based on the references available in the basic Unani classics & relevant modern texts.

Conclusion: The study concludes that the understanding of concepts of absorptive faculty can be helpful in determining various medical conditions in clinical practice and specially of chronic metabolic disorders, like malabsorption syndrome, diabetes mellitus, diabetes insipidus, hemochromatosis etc.

Keywords: Quwwat-e-jazibah, absorption of nutrients, malfunction of absorptive faculty, unani medicine

1. Introduction

If an organism is to survive, grow and to reproduce, then it must be able to obtain/assimilate and utilize food with other essential components and to carry out this necessary action, the human body has been furnished with a specialized natural power, "Quwwat-e-Tabiyah", which is associated with the process of nutrition, growth and reproduction. Nutrition (taghziya) is the collective term for three processes viz., apposition of the altered material (Badal-e-ma yatahallal), adherence or agglutination (Ilsaque) and assimilation (Tashbeeh) that is being carried out with the help of three different abilities viz., Quwwat-e-Muhassila, Quwwat-e-Mulassiqah and Quwwat-e-Mushabbiha respectively. Taghziya belongs to the genus of Quwwat-e-Ghaziyah, the faculty which brings about changes in the food in such ways that could easily be utilised by the body as a source for replenishment of the lost part of the organ (badal-e-mayatahallal) by wear and tear during its functioning. It accomplish these functions with the help of the following four faculties, i.e Quwwat-e-Jazibah, Quwwat-e-Masika, Quwwat-e-Hazimah, Quwwat-e-Dafi'a. These faculties are mediated through different primary temperamental qualities-heat, cold, dryness, moisture, and heat is the main factor in all the subservient faculties^[1]. Body uses every quality for completion of various organs' functions, but some function require dominance of one or other and thus is attributed to that quality, it is so temperament is compound of them. An excess of any quality would lead imbalance in temperament and this results in loss of function or retardation. Hence considering the relevance, the present study was aimed at reviewing the basic concepts of Absorptive faculty as per Unani system of Medicine as well as modern view and the diseases associated with immoderation of this faculty.

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2. Materials & Methods

The present literary review of basic consideration of absorptive faculty has been done incorporating important Unani literature for the different aspects associated with absorptive faculty and a possible correlation was attempted with the subject of absorptive faculty by referring different text book of physiology, biochemistry and pathology for pathological basis of diseases.

3. Quwwat-e-Jazibah (Absorptive faculty)

It is one of the subserving powers of Quwwat-e-Ghaziya that absorbs the food material into the body as well as inside the body. Ibn Sina mentions that “the attractive (absorptive) faculty was created so that the body could draw to itself whatever nutriment is required for its preservation”. He further states that “the attractive faculty needs more heat than dryness because the chief feature of attraction is movement, and movement demands energy. The organs concerned must move rather than be at rest, and contracted”^[1]. According to Abu Sahl Masihi, it is a two fold faculty; one found in gastrointestinal tract that helps in the process of absorption of digested food along with Quwwat-e-Hazimah, Masika and Dafi’a and the second one is present in all the cells of the body, which absorbs the nutrients and metabolize them into various compound and for replacement of the wear and tear and provide energy^[2, 3].

Ali Abbas Majoosi^[4] and Ibn-e-Sina^[5] have mentioned three types of physical forces operating in the absorption of materials in the organs; (i) the attraction as when magnet attracts the iron, (ii) vacuum like attraction as ascending of water etc. to the top of the trees through their roots, and (iii) attraction due to heat as when oil of the lamp drawn up towards the flame through its wick. Its functioning can be better understood in stages as follows:

3.1.1 Ingestion of food into the stomach through absorptive faculty

Ali Abbas Majusi states that the absorptive power, which attracts and ingests the food and propels it into the stomach, operates through two powers; Quwwat-e-Mushtahiyah and Quwwat-e- Izdradiyah^[4].

(a) Quwwat-e-Mushtahiyah (power of appetite): regulates appetite and intake of food and drinks in accordance to the requirements of the internal environment through the appetite centres viz., Hunger centre (feeding & thirst centre) located in lateral hypothalamus and Satiety centre in ventromedial part of the Hypothalamus. It controls the attraction and aversion to certain types of food, as required by the body to maintain the etidal mizaj (homeostasis).

(b) Quwwat-e-Izdradiyah (power of deglutition): regulates swallowing of food through deglutition centre located in the medulla oblongata & inferior pons. Deglutition involves a series of voluntary and involuntary neuromuscular contractions through which a food or liquid bolus is transported from the mouth through the pharynx and esophagus into the stomach.

3.1.2 Absorption of products of digestion in the epithelium of small intestine

The small intestine is the site of most of the nutrient absorption where the epithelial surface of small intestine contains small finger-like projections of tissue called villi, which increases the surface area of the intestine and contain

specialized cells that transport substances into the bloodstream. These villi are in constant, wave-like motion to increase the absorptive potential of the small intestine by increasing its surface area. On each villi there are even tinier microvilli, which are the main sites where absorption occurs. These microvilli are nutrient-specific; sugars are absorbed by one type, amino acids on another. The nutrients are taken up by the network of capillaries present inside each villi and delivered to blood supply. The absorptive faculty operates inside the epithelial cells of the mucous membrane of the small intestine, through which the digested material, electrolytes, vitamins and water are absorbed in and transported to the blood vessels by the process of simple diffusion, facilitated diffusion, primary active transport and secondary active transport mechanism^[6].

The carbohydrates are absorbed from the small intestine mainly as monosaccharides. Both glucose and galactose are absorbed from the lumen of small intestine into the epithelial cells of the mucus membrane of small intestine and process is mediated through Sodium dependent

Glucose Transporter-1 (SGLuT-1) by co-transport mechanism (secondary active transport) via the symporter SGLT, whereas fructose is absorbed by facilitated diffusion via GluT5. All of the three monosaccharide leave the cells and get absorbed into the portal vein by facilitated diffusion via GluT2 to enter the blood stream^[6, 7]. Proteins are digested into di- and tripeptides and amino acid by various enzymes. Amino acids are absorbed by specific carrier with Na⁺ and secondary active transport via a symporter and small peptides are absorbed through different types of symporter driven by H⁺ ion and some other peptides are carried intact across the cell by transcytosis.^[6] The lipids are absorbed in the form of fatty acid, cholesterol and monoglycerides. In the lumen of intestine, with the help of bile salt & phospholipid the fatty acids and glycerol are converted into micelles. These micelles are absorbed by epithelial cell through simple diffusion. In the golgi apparatus of cells, micelles are reformed into very small protein coated fat globules called chylomicron, which are extruded from the epithelial to enter the lacteals and then get absorbed into the blood from the lymph. The specialized cells of intestinal epithelium help to absorbed materials cross the intestinal lining into the bloodstream.^[6]

3.1.3 Absorption of digested material into the liver from intestine

Ibn-e-Sina states that “liver attracts the chyle from the stomach by sucking, as it were, the purer parts thereof by way of the mesenteric veins^[1].” The bloodstream carries glucose, amino acids, glycerol, and some vitamins and salts to the Liver, the first organ to absorb nutrient just taken in by the intestines and plays a major role in carbohydrate, protein, amino acid, and lipid metabolism. The hepatic portal system connects the capillaries of gastrointestinal tract (GIT) with the capillaries in the liver. The nutrient rich blood leaves the GIT and is first absorbed by the liver for processing before being sent to the heart.

3.1.4 Absorption of nutriments into various cells and tissues through Quwwat-e-Jazibah

Ali Abbas says, “Quwwat Mudabbira-e-Badan (Tabiyat) has furnished each organ with absorptive faculty (quwwat-e-jazibah), so that it could absorb such parts of ghiza which are to the likeness of the organ and appropriate to it”^[2].

The nutrients like glucose, amino acids, fatty acid get absorbed into the cells of different organs through their

quwwat-e-jazibah. The mechanism of absorption is either through different physical forces i.e. diffusion, osmosis or through active transport. For example, Glucose enters into the cell from extracellular fluid through Glucose transporter i.e. GluT 1, 2 and 4 by using sodium ion. A sodium-potassium pump maintains a concentration of Na⁺ that is higher outside the cell than inside, then sodium ions move back into the cell through a transport protein that also moves glucose inside the cell [7, 8].

4. Inequability of Absorptive Faculty (Absorptive Malfunction)

In Unani system of medicine, functions are mirror to their respective faculties and eventually of the mizaj (temperament) and saht (structure) of the concerned organs. The normal functioning is indicative of the normal structure and temperament and any derangement from normalcy will lead to dysfunctioning of the related faculty. Any immoderation/inequability of Absorptive faculty (Quwwat-e-Jazibah) might result either from a hyperactive state or from a decreased activity. However, most of the diseases result from the decreased ability to absorb nutrients and some disorders caused by increased absorption of certain nutrients.

4.1 Immoderation of Quwwat-e-jazibah due to decreased ability to absorb

The immoderation of quwwat-e-jazibah due to decreased ability to absorb nutrients results in many diseases some of which are Malabsorption syndrome, Anaemia, Diabetes Mellitus (inability to absorb glucose) and Diabetes Insipidus (inability to reabsorb water) etc.

4.1.1. Malabsorption Syndrome due to Immoderation in absorptive faculty of Intestine

The small intestine absorbs most of the digested food molecules as well as water and minerals, and passes them on to other parts of the body either for storage or for further processing. Any abnormality in the absorptive faculty of surface epithelium of GIT can cause Malabsorption Syndrome [9] (MAS), which is characterized by impaired intestinal absorption (Naqs-e-Quwwat Jazibah Mevi) of nutrient particularly of fat; other being proteins, carbohydrates, vitamins and minerals. MAS is further categorized into Primary MAS and Secondary MAS.

(i) Primary Malabsorption: occurs due to deficiency (primary) of the absorptive mucosal surface and of the associated enzymes that includes:

a) Coeliac disease: caused by sensitivity to gluten, a protein in wheat and barley. After exposure to gluten, inflammatory changes occur in the intestinal surface leading to flattening of intestinal villi, thus deters the absorption of nutrients.

b) Tropical sprue: more common in tropical and subtropical areas of the world, including the Caribbean and South-East Asia, and occurs due to an infection that damages the lining of the small intestine. The patients inflicted with tropical sprue are often deficient in both vitamin B12 and folate as the intestinal lesion makes it difficult to absorb them. This eventually leads to the combined deficiency of folate and vitamin B12, characterized by macrocytic megaloblastic anemia, glossitis and neurological manifestations.

c) Whipple's disease: caused by the bacterium *Tropheryma*

whippelii that usually infects the small intestine and cause malabsorption. Whipple's disease not only involves the intestines but also various other systems such as central nervous system, heart, blood vessels skin, joints, lungs, liver, spleen and kidneys and cause serious complications.

(ii) Secondary Malabsorption: in which absorptive mucosal changes occurs secondary to other factors like diseases, surgery, trauma and drugs. The Mucosal damage is caused by Tuberculosis, Crohn's disease, Hepatic and pancreatic insufficiency and by uses of drugs e.g. methotrexate, neomycin.

4.1.2 Iron-deficiency Anemia due to Iron Malabsorption

Iron from food is absorbed into the bloodstream in the small intestine, mainly in the duodenum. The gastrointestinal disorders of malabsorption like celiac disease reduce the body's ability to absorb iron resulting in iron-deficiency anemia. Abnormalities or surgical removal of the stomach can also lead to iron malabsorption by altering the acidic environment needed for iron to be converted into its absorbable form. If there is insufficient production of hydrochloric acid in the stomach, often due to chronic H. pylori infections or long-term proton pump inhibitor therapy, inhibiting the conversion of ferric iron to the absorbable ferrous iron [7].

4.1.3 Diabetes Mellitus due to Immoderation in absorptive faculty of Cells

The transport of glucose into the cells is mediated by two systems; one is Insulin-independent transport system in hepatocytes, erythrocytes and brain cells which do not need insulin for the entry of glucose, instead these cells possess GluT1 & GluT2 channels for its direct transportation. On the other hand, Insulin dependent transport system in muscle cells and adipocytes have (GluT4), transports glucose from the extracellular fluid into these cells. The presence of insulin, which signals the fed state, leads to a rapid increase in the number of GluT4 transporters in the plasma membrane [7, 8]. Normally, insulin binds with an insulin receptors on the cell and activates it, which then causes the translocation of GluT4 vesicle to the cell membrane and thus, cell takes up glucose through GluT4 from Extra Cellular Fluid, which is used for energy production. In Diabetes Mellitus type 2, either there is an insufficient production of insulin or the body tissues become resistant to insulin that inhibits signaling to the GluT4 and thus, the absorptive power (quwwat-e-jazibah) of the cell becomes low preventing GluT4 to absorb glucose into the cytoplasm [7].

4.1.4 Diabetes Insipidus due to Immoderation in absorptive faculty of Collecting duct of Kidney

Roughly 70% of the body mass is water and despite wide variation in daily water intake, body water content remains nearly stable. This is achieved through Anti Diuretic Hormone (ADH), which helps to conserve body water by reducing its loss in urine. ADH binds to the receptors on cells in the collecting ducts of the kidney and promotes reabsorption of water back into the circulation [6] Diabetes Insipidus, a condition characterized by polyuria occurs either from low secretion of ADH (usually due to a tumour or trauma of the Pituitary or Hypothalamus), or as a result of insensitivity of kidneys to it. In the absence of ADH, power of reabsorption (quwwat-e-jazibah) of collecting duct becomes low and the ducts are virtually impermeable to water leading

to passage of large volumes of diluted urine of low specific gravity (below 1.010), with urine volumes that can exceed 15 L/day^[6,9].

4.2 Immoderation of Quwwat-e-Jazibah Due to Increased Ability to Absorption

Some disorders that increase the absorption of certain nutrients include hemochromatosis (increased iron absorption or iron overload disease), cholelithiasis etc.

4.2.1 Hemochromatosis

Hemochromatosis is an iron storage disorder in which there is an excessive accumulation of iron in the parenchymal cells followed by functional insufficiency of organs such as the liver, pancreas, heart and pituitary gland. It exists in two forms; Primary and Secondary hemochromatosis. The primary hemochromatosis is caused by mutation in HFE gene located on chromosome 6 and normally regulates the intestinal absorption of iron. Mutated HFE gene complexes with transferrin receptor on intestinal crypt epithelial cells and results in excessive absorption of dietary iron throughout life. In secondary or acquired hemochromatosis, there is excessive accumulation of iron due to acquired causes like ineffective erythropoiesis, defective haemoglobin synthesis, multiple blood transfusions and enhanced absorption of iron due to alcohol consumption.^[9,10]

4.2.2 Cholelithiasis

When bile is stored in gallbladder it undergoes both quantitative and qualitative changes because of absorption of water and electrolytes. Any damage or infection of gallbladder epithelium alters the absorptive function of the mucous membrane and may result into excessive absorption of water or even bile salts, leading to deposition of solid crystals of cholesterol, calcium ions and bile pigments in the gallbladder or bile duct^[11].

5. Discussion

After detailed study of Quwwat-e-jazibah, it can be comprehended that the concept of absorptive faculty is well described in Unani system of Medicine as well as modern medical science in similar manner with language and technical differences. The absorptive faculty (Quwwat-e-Jazibah) operates at different levels of process of nutrition and its optimum function is required to nourish the organs and to provide substitute for what is being lost in wear and tear, in accordance to the requirement and temperament of respective organ. It is necessary for ingestion of food in stomach, absorption of digested product in small intestine and absorption of nutrients in cell and tissue of different organ from blood stream. The mechanism of absorption and transport of nutrient is either through different physical forces i.e. simple diffusion, facilitated diffusion, osmosis or through active transport by the process of primary active transport and secondary active transport system. Any immoderation/defect in functioning of absorptive faculty will hamper the process of nutrition, which will eventually affect the health adversely, as can be witnessed in malabsorption syndrome (i.e; celiac disease, tropical sprue, whipples disease), vitamin B12 & folate deficiency, diabetes mellitus, diabetes insipidus, hemochromatosis, cholelithiasis etc.

6. Conclusion

Unani physicians like Majoosi, Maseehi and Ibn-e-Sina, have conceptualized alteration of functions in terms of

immoderation of temperament and structural changes that is also applicable to Quwwat-e-jazibah, and from the above review it can be concluded that they were right to a large extent, since most of the malabsorptive diseases can be effectively correlated with Unani concept of pathogenesis. Thus, the basic knowledge of absorptive faculty is definitely fruitful to understand different function of Quwwat-e-Ghaziyah, and its sub serving faculties, while seeking the prevention and treatment of various metabolic diseases.

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