

Imbalances Due to Excess Weight

Lisa Le

Red Rocks Community College

BIO202C03

Professor Kimberly Jeckel

October 31, 2020

The respiratory and digestive systems are very important to the human body. These systems aid in maintaining the human's body's homeostasis. Without these systems, humans would not be able to survive and carry out everyday functions. The organs and tissues of the body would not be able to receive what they need to keep functioning, like nutrients and oxygen. If these functions did not work properly, it would cause the rest of the organs in the body to fail, which then would cause death. One thing that could affect the way these two systems work is body weight. If someone has a large excess of body weight, it will hinder how effective these systems will work to support the body. Medical conditions may start to appear as excess weight increases. This could be quite dangerous if not monitored or cured. The respiratory and digestive system will come in and do what they can to help maintain balance in the body, but they can only do so much. That is where medication and surgeries come in if things do not get better.

The respiratory and digestive systems contain physical and chemical regulatory mechanisms that help maintain homeostasis. The respiratory system's main function is to provide oxygen to the tissues in the body for cellular respiration, remove carbon dioxide, and to help maintain acid-base balance (Anatomy and Physiology, n.d.). The respiratory system is divided into two zones; the conducting zone and the respiratory zone. The conducting zone is in charge of providing a route for incoming and outgoing air, removing debris and pathogens, and warming and humidifying the air coming in. The respiratory zone is then responsible for gas exchange. It contains structures that are directly involved in that process (Anatomy and Physiology, n.d.). There are two types of gas exchanges that the respiratory system goes through; the external and internal respiration. External respiration is the gas exchange between the lungs and the blood. Internal respiration is the gas exchange between blood and tissue cells. Cellular respiration or cellular metabolism can then occur because of these gas exchanges (Mechanics of

Ventilation, n.d.). The respiratory system is controlled by a negative feedback loop which helps with bringing back certain values back to the normal levels. This mechanism occurs when the changes have been sensed to be over the normal levels by receptors. The information that was gathered from the receptors will be assessed, and the receptors themselves will then send out another message to the rest of the body. The message going out from the receptors will cause a change in respiration, and that will help return any values back to normal levels (Control of Respiration, n.d.). The respiratory system works hand-in-hand with the digestive system to keep the body functioning. This system is continually at work and it is responsible for breaking down foods that are being ingested. Food will then release their nutrients and the digestive system will absorb those nutrients into the body (Anatomy and Physiology, n.d.). The majority of digestion and absorption of nutrients occurs in the small intestines of the body. Food undergoes three steps in the body; digestion, absorption, and elimination. The digestive system also goes through six different steps to prepare the nutrients for utilization by body cells. (General Structure of the Digestive System, n.d.). The six processes or functions are ingestion, mechanical digestion, chemical digestion, movements, absorption, and elimination. For ingestion, this is just the simple step of eating food through the mouth. Mechanical digestion is when the large pieces of food are broken down into smaller parts via mastication or chewing. The enzymes in the saliva will also help with this process. Chemical digestion is when the smaller parts get broken down into smaller molecules so that it can be used and absorbed by cells. Movements will then help the food particles and molecules travel through the body. Smooth muscle contraction of the stomach will aid in the movement of food through the body. Absorption is the small molecules, produced during chemical digestion, is passing through cell membranes of the small intestines into the blood or lymph capillaries. Lastly, elimination is when the leftover food molecules, which could

not be absorbed, are eliminated from the body. The removal will pass through the rectum and anus in the form of feces (General Structure of the Digestive System, n.d.). Both digestive and respiratory systems are crucial for maintaining homeostasis.

Excess weight can cause imbalances in the human body which can then lead to other health conditions. It has been known to progressively cause a wide spectrum of comorbidities like type 2 diabetes, hypertension, dyslipidemia, cardiovascular disease, non-alcoholic fatty liver disease, reproductive dysfunction, respiratory abnormalities, and even increase the risk for certain cancers (Kyrou, 2018). Excess weight, also known as obesity, and the risks of other health conditions will depend on the degree, duration, and the distribution of excess weight/adipose tissue. Not only will obesity cause a risk for all those health issues, the imbalances may also create other minor, compared to diseases, problems as well. Accumulated fat and increased body weight can cause joint pain, problems with the respiratory tract, and complications with the blood vessels or within the abdominal compartment (Kyrou, 2018). Obesity can cause the respiratory system to work poorly. It was stated that increased body weight and fat accumulation in the abdomen and chest wall can have a significant impact on respiratory physiology. That itself can lead to the deterioration of the pulmonary function (Kyrou, 2018). Lung capacity is also known to decrease as the degree of obesity increases. Excess weight can play a huge affect on how well the body can function.

When excess weight becomes a huge problem for a long time, patients may result in bariatric surgery. There are three different types; gastric band, gastric sleeve, and gastrointestinal bypass. These are known as weight-loss surgeries that are supposed to make changes to the digestive system to help with losing weight. The first type is the gastric band. This procedure consists of inserting an adjustable, silicone band around the patient's upper part of the stomach.

This is to decrease stomach size and reduce food intake. This procedure is minimally invasive and is performed through keyhole incisions. The procedure overall takes about 30 to 60 minutes (Gastric bands, 2018). A very restricted fluid diet is advised at first, and then after four weeks, blended foods can be eaten. Normal food cannot be ingested until after the six week mark from the surgery date. Some benefits are no loss of nutrient absorption, smaller chances of infections or hernias, and an improved quality of life after surgery. Some risks are a possibility of an adverse reaction during surgery, weight loss may be a slower process, and/or the band can slip or have mechanical problems (Gastric bands, 2018). The second type of bariatric surgery is gastric sleeve. This procedure removes about 80% of the stomach, and only leaves a long, tube-like pouch (Bariatric surgery, 2020). This causes the stomach to not be able to hold as much food and reduces the production of the appetite-regulating hormone ghrelin. Some advantages are that the hospital stay is a lot shorter, and that the weight loss outcome will be much quicker than the other surgeries (Bariatric surgery, 2020). The last type of surgery for weight loss is the gastrointestinal bypass. This procedure helps with losing weight by changing how the stomach and small intestines handle ingested food (Kunin, 2018). Staples are used in this process to help divide the stomach into smaller sections. By doing this, not all the food ingested will go through parts of the stomach and the small intestines. That means all of those particles will not be absorbed and just get excreted from the body. Also the small intestines will be rearranged a little bit to reduce absorption to help with weight loss. Some advantages for this procedure is less pain, shorter stay in the hospital, a quick recovery, and it takes about two to four hours to complete the surgery (Kunin, 2018).

The digestive system and respiratory system are crucial for maintaining homeostasis. When one of these systems is not working properly, it also affects the other system. It can

decrease the effectiveness of their functions which could then cause complications to the human body. An example is when excess weight becomes a problem. Obesity is known to be an epidemic and can cause many health problems for people. It can cause type 2 diabetes, respiratory problems, cardiovascular problems, and even increase risks for certain cancers or diseases. If the excess weight becomes a huge problem, doctors will ask the patient to start losing weight by exercising or controlling their diet. If that does not work and the health issues are severe, they may suggest bariatric surgery. There are three different kinds that were talked about earlier that would change the way the stomach and/or the small intestines work to help with losing weight. By doing those surgeries, the health conditions may decrease or become less severe which will then help the systems of the body operate more ideally. The quality of life would be a lot better when the human body is operating at a more ideal level overall.

References:

Anatomy and Physiology. (n.d.). Retrieved October 31, 2020, from

<https://openstax.org/books/anatomy-and-physiology/pages/1-introduction>

Bariatric surgery. (2020, January 22). Retrieved October 31, 2020, from

<https://www.mayoclinic.org/tests-procedures/bariatric-surgery/about/pac-20394258>

Control of Respiration. (n.d.). Retrieved October 31, 2020, from

<http://www.pathwaymedicine.org/control-of-respiration>

Gastric bands: How it works, surgery, who should have it. (2018, May 24). Retrieved October

31, 2020, from <https://www.medicalnewstoday.com/articles/298313>

General Structure of the Digestive System. (n.d.). Retrieved October 31, 2020, from

<https://training.seer.cancer.gov/anatomy/digestive/structure.html>

Kunin, J. (2018, June 21). Gastric bypass surgery: MedlinePlus Medical Encyclopedia. Retrieved

October 31, 2020, from <https://medlineplus.gov/ency/article/007199.htm>

Kyrou, I. (2018, January 11). Clinical Problems Caused by Obesity. Retrieved October 31, 2020,

from <https://www.ncbi.nlm.nih.gov/books/NBK278973/>

Mechanics of Ventilation. (n.d.). Retrieved October 31, 2020, from

<https://training.seer.cancer.gov/anatomy/respiratory/mechanics.html>