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Physiological Principles for Health and Social Care

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Introduction

Human body is structured of a range of chemicals that are the product of same elements as illustrated in periodic table of chemistry. Atoms of these elements structure molecules and molecules of various elements react together and develop chemical compounds. These chemicals compose human body. For instance hydrogen and oxygen react together and produce water and the foremost part of a human body is water (Cao et al, 2011). Highest level of human body function is the organism and organs are made up of two or more tissues. Every organ has particular function that contributes to form a system.

Cell is foundation of a living being and is inclusive from anatomy and physiology view point. All characteristics of living being and physiological reaction occurring in human body are existed in a cell. There are diverse kinds of cells in a human body, though foundation elements of a variety of cells are alike but their formation varies from each other based on their key function.

LO1: Cellular Metabolism: ATP is a critical substrate, as the hydrolysis produced by it, provides force for various metabolic and biochemical effects entailed in maturity, adaptation and cell endurance (Holloszy, 1988). ATP creation in an aerobic cell is characteristically efficient when the dilapidation of main nutrients such as acids produced by fat and glucose is together to a supramolecular composite situated in the inner-membrane of mitochondria to coerce oxidative phosphorylation. This ascent is employed as an energy foundation by ATP synthesis through the synthesis of an ATP molecule from a molecule of adenosine diphosphate (ADP) and an inorganic phosphate.

Liberated radical oxygen species (ROS) have the capacity of oxidizing cellular essentials such as proteins, deoxyribonucleic acid (DNA), membrane phospholipids and other adjoining biological mechanism. In addition, mitochondrial respiration principally generates a little amount of ROS, chiefly the superoxide anion O_2^- . The anion is swiftly transformed into hydrogen peroxide (H_2O_2) by metallo-enzymes and superoxide dismutase (SOD).

Homeostatic Functions: The human body sustains a consistent internal setting in order to function appropriately. It necessitates the body to generate a variety of adjustments. These adjustments that occur inside the body are termed the regulation of homeostasis. The very regulation is consisted of three chief parts: a receptor, a control center and an effector. The *receptor* functions by receiving information about the transformation occurring in the settings. The *control center* then progresses the information even as the *effector* transmits the affects of the control center by conducting changes in response (Spriet & Howlett, 1999).

It also performs the function in the body to retain a stable internal temperature that essential for living organisms to function. This entails the excretion of metabolic wastes, the preservation of a water balance and the regulation of chemicals within the body. The kidneys sustain the volume of the blood, confiscate nitrogenous wastes and adjust pH. A functioning kidney sustains homeostasis through the confiscation of detrimental wastes from the body and monitors the balance of substances in the blood such as water, acids, ions and salts. The functioning lungs remove CO_2 and water through excretion, since CO_2 is chiefly transported in the plasma as bicarbonate ions that act as a chemical shield, the respiratory system also supports in maintaining the appropriate blood pH levels.

The role of the endocrine system in cellular metabolism: The operations of the Endocrine System are to sustain homeostasis in the body by liberating chemicals that are hormones. The chief progressions regulated by hormones are reproduction, growth and development, mobilisation of body resistance against stressors, safeguarding of electrolyte, water, and nutrient balance of the blood, and monitoring of cellular metabolism and energy equilibrium. Endocrine system is based on several hormones that directly affect human growth a number of hormones are particularly vital such as GH, thyroid hormones, insulin, PTH, calcitriol, and reproductive hormones.

Abnormal Health Pattern (obesity & underweight): Obesity is growing swiftly throughout the world in both children as well as adults. Human being is widely affected by the expansion in standards of living style, decline in physical activities, and nutritional changes. Obese are at further risk of man-made disease including HTN, type 2 diseases, Cardiovascular disease, stroke, gall bladder disease, osteoarthritis, sleep apnea and respiratory health issues, certain kinds of cancers (breast, Colon, endometrial).

LO2: Long-term Physiologic Responses to Resistance Exercise: Profound resistance training is proportionately related with augmented body weight, lean body mass, and muscle cross-sectional area that result in hypertrophy of individual muscle fibers (Kraemer & Ratamess, 2005). Enzyme activities, revealing oxidative probable; decrease during long-term profound resistance training, consequential to muscle hypertrophy. Though glycogen storage capacity is enhanced, enzyme activities reflecting an aerobic metabolism do not augment in response to profound resistance exercise. The ultimate effect of long-term physiologic response on the systems of human body including:

Respiratory System: healthy lungs have increased ventilation during exercise in order to respond to the pH level of lactic acid. Nevertheless, during hard exercise session, when the person is near exhaustion, both arterial PCO₂ and pH fell below the resting level. It can be said that the response of respiratory control, during exercise, is just like cardiovascular control where the muscles response is controlled by a central command to work proportionally with exercise according to the feedback modulation send through lungs.

Musculoskeletal: Mobilisation, exercise, and sports necessitate the production of energy by skeletal muscle fibers and energy is generated whilst static muscles, become shorter or enlarge in length. These operations are the consequence of biochemical and structural transformations that occur within the skeletal muscle fibers after neural foundation and that require vigor in the form of adenosine triphosphate (ATP). Musculoskeletal is a heterogeneous tissue in term of muscle fibers, vary in functional, physiological, and biochemical peculiarities. Diverse procedures have been employed to classify skeletal muscle fibers, such as histochemical techniques, such as ATP and oxidative enzyme stains, measurements of contraction or fiber-shortening velocity, and the detection of the myosin profound chain isoform by utilizing protein electrophoresis. More often, human skeletal muscles consist three kinds of fibers in unstable extent: fiber types I, IIa, and IIx. Fibers that put across type I myosin profound chain isoform are the measured, oxidative, fatigue-resistant fibers. Type IIx fibers; are very swift in contracting, glycolytic, and fatigable fibers. Type IIa fibers have transitional peculiarity that is rapid contracting but with an oxidative metabolic details. These fibers are recognised as hybrid fibers and are more prevalent in muscles recuperating from injury, aging, and undergoing strength exercise (Eltzschig & Collard, 2004).

Cardiovascular System: The oxidative system has a profound-energy production during long-term exercise. Oxidative phosphorylation is reliant on an incessant supply of oxygen as the quantity of oxygen stored in cells in hemoglobin and myoglobin is little and of short duration, it is restock from the environment (Neely & Morgan, 1974). A sequences of systems certain a sufficient supply of oxygen to situate of oxidation in the mitochondria of functional tissues: consumption of environmental oxygen through alveolar ventilation, circulation of oxygen into the blood, surge of blood to the tissues, and successfully diffusion of oxygen into muscle cells and mitochondria. When a person exercises profoundly, there is a linear augment in oxygen consumption to adequate the demand until the maximal oxygen consumption ($VO_2 \text{ max}$) is attained. Cardiac productivity is the result of stroke volume and heart rate. The A- VO_2 variation is an indicator of the efficiency of functional muscles in extracting the oxygen from arterial blood. Furthermore, approximately 20%-30% of the blood's original oxygen substance of 20 ml of oxygen per 100 ml of arterial blood is extracted at the tissue intensity. In the nonexistence of lung disease, CaO_2 is stable during long-term exercise and CVO_2 is decreased during exercise, as a result the A- VO_2 variation augments gradually with exercise intensity. At the linear function of the heart, the raise in plasma volume causes a boost in end-diastolic volume and in the elastic withdraw of the left ventricle. Fortitude training also pilots to an elevation in left ventricular muscle mass and dilatation that yields in a more vigorous contraction.

The breathing of an athlete is slower and deeper than an ordinary person, which enables the athlete to inhale 10 milliliter air per Kg. An athlete of 30Kg weight breathes only 15 times in a minute and in each breathe he or she inhale 300 milliliters of air, which 4500 milliliters of air is entered into an athlete's body per minute. In other words, it can be said that athletes' airways ventilation is much more efficient than an ordinary person.

LO3

After measuring the anthropometric data of the 25 years old male, it has been found that his BMI is 37.4 Kg/m^2 and he is an obese person. The main disadvantage of this measurement tool is that it gives no information on the distribution of fat reserves. But when the fat is mainly concentrated in the belly area, the risk of diabetes and cardiovascular disease is higher than if concentrated in the hips and thighs. In addition, BMI does not distinguish between bone mass, muscles (muscle mass) and fat (body fat). Therefore, BMI is not accurate for people with a big frame and is very muscular, like athletes and bodybuilders (Van et al, 2006).

The waist, often used in conjunction with BMI, can detect an excess of fat in the abdomen. It is about abdominal obesity when waist circumference is greater than 88 cm (34.5 inches) for women and 102 cm (40 inches) for men. In this case, the health risks (diabetes, hypertension, dyslipidemia, cardiovascular disease, etc.) are increased considerably. To assess the existence of risk factors for disease, a blood test (in particular lipid profile) gives valuable information to the physician.

Obesity is not only an aesthetic issue. This excess weight greatly increases the risk of developing certain diseases. Mortality itself is increased. Obesity is not a problem to be taken lightly. It is a real threat to health. The mortality risks are increased, especially since obesity is early and severe. Risks associated disease depends on the age and already present conditions.

They are:

- The non-insulin dependent diabetes;
- Cardiovascular disease including high blood pressure;
- Respiratory problems including sleep apnea;
- Musculoskeletal problems in the hips, knees and spine;

- Metabolism problems, including blood lipids;
- Hormonal abnormalities;
- The calculations of the gallbladder;
- Venous and skin problems;

Psychological and social obesity is a functional impairment in everyday life. It creates difficulties in hiring and frequent updates on disability for medical reasons. It is a source of social discrimination in adults and in children and often leads to depression.

When trying to understand why obesity is so widespread, it appears that the causes are multiple and do not rely solely on the individual. Government, municipalities, schools, the food industry, etc. also bear some responsibility in the creation of obesogenic environments.

Obesogenic environment expression used to describe a way of life that contributes to obesity:

- Access to high fat, salt and sugar, high-calorie and low-nutrient (junk) foods;
- Sedentary and stressful life;
- Living environment is not conducive to active transportation (walking, cycling)

This obesogenic environment has become the norm in many industrialized countries and is found in developing countries. People whose genetic make up is so that they gain weight easily are more likely to be victims of the obesogenic environment. However, susceptibility - related genes can lead to obesity alone.

Obese people have a lower quality and shorter expectancy of life than normal people. Moreover, professionals predict that today's youth are the first generation of children whose life expectancy does not exceed that of their parents, mainly because of the increasing incidence of obesity infantile.

Finally, obesity can become a psychological burden. Some people feel excluded from society because of the criteria proposed by the beauty industry and the media. Given the difficulty to lose their excess weight, others will live great distress or anxiety, which can go up to depression (Levy-Navarro, 2008).

In order to ascertain the cardiovascular health of an obese person, physicians suggest some tests which depicts the overall health of obese persons. These tests include:

- **Initial Assessment:** It is based primarily on clinical evaluation, a resting electrocardiogram, transthoracic echocardiography;
- **Evaluation in Effort:** it includes an initial stress test (maximum or limited by symptoms or limited by a frequency or peak systolic blood pressure), a cardiopulmonary exercise test, an intermediate stress test (indicated especially if new symptoms with exertion), a final stress test (after rehabilitation), a test of 6-minute walk and an assessment of muscle strength

LO4

Pneumonia, especially bacterial pneumonia can affect people of all ages; however people of old age, or people who are weak due to surgery or have respiratory problems or viral infections may become the victim of bacterial pneumonia more easily. Pneumonic symptoms may occur both gradually or suddenly, these include:

- Fever up to 40.5 ° C with shivering;
- Severe pain in the chest above the inspiration and coughing up phlegm (sputum);
- Sweating , breathing and pulse that is accelerating.
- Lips and nails can sometimes turn blue due to lack of oxygen in the blood

On the other hand, pneumonia caused by viral infection has symptoms like:

- Fever, dry cough , headache , body ache and sagging;
- After 12 to 36 hours of initial symptoms, patient's chest tightness pronounced. Cough sputum increases but are rare and may be blood-stained. The individual patient is feverish and may even have bluish lips. At the final stage, the patient suffocates and made prodigious efforts to breathe (McLuckie, 2009).

Pneumonia is the grave of the old people. The clinical signs are subtle. The simultaneous occurrence or staggered with rapid breathing with cyanosis, a mild fever, poor appetite with asthenia, a state of prostration, progressive dehydration, unexplained should suggest the diagnosis of pneumonia and seek physical and radiological signs. In chronic respiratory failure, tends to the local spread of infection and especially the sudden worsening of impaired respiratory status already explain the frequent need of these patients under mechanical ventilation. Among patients with visceral disease (diabetes, cirrhosis, cancer, steroid therapy, agammaglobulinemia, chronic renal failure, AIDS etc.), pneumonia affects life in danger.

Most of the time pneumonia is treated with an antibiotic macrolide (erythromycin , clarithromycin, azithromycin). There is usually no reason to go to the hospital. The bacteria that cause pneumonia are increasingly resistant to antibiotics. This is particularly worrisome in the case of hospital-acquired pneumonia. If the antibiotic does not seem to take effect after a few days, it may be necessary to change the antibiotic. To avoid contributing to the resistance, it is important to take prescribed courses as prescribed by the doctor.

Antibiotics are not effective against viruses. In some cases, antiviral drugs can be used, such as oseltamivir (Tamiflu) or zanamivir (Relenza). If necessary, other medicines help relieve

chest pain and to reduce fever. A visit to the doctor for 4 to 6 weeks after diagnosis and CXR will ensure that pneumonia is cured. If it does not heal in the usual time, the doctor will recommend an appropriate investigation, such as a CT examination (CT) or bronchoscopy. When pneumonia is severe or that the risk of complications is high , hospitalization may be necessary. We can then administer drugs intravenously or provide oxygen if it is found that the blood oxygen level is too low.

Effect of Pneumonia on Elderly People

In the old age, the muscles lose their volume, while the fat tissue increased, vaulting to the spine as a result of decrease in height of the vertebral bodies (Balaban et al, 2005). The body slows: the elderly walk more slowly and you will not see it running, then the process becomes more hesitant, it is small steps , walking with less confidence on slippery sidewalks, takes longer to cross the street intersections , and then she returned with caution in the bath is less alert to dress , rises more slowly from bed or a deep armchair. This slowdown of muscles has been further increased with Pneumonia because old patient becomes unable to move from their bed.

Such slowdown of movement may cause emotional disturbance and anxiety in the old patients. Such elderly patients may, for example, show signs of excessive agitation (moving without stopping, turn in his room like a caged bear or be unable to sit still or relax), while a person with extreme fatigue may be comments like : "I do not get out of bed in the morning," " I do not have enough energy to start anything." These two opposite reactions show that anxiety affects mobility.

Seniors who experience pain with every movement in the long end up not wanting to move or go outside unless you have a valid reason to do so. Social obligations such as family outings or with friends, visits to church, etc. are valid reasons motivating enough (Park, 2007).

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