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Environmental Stressors and Human Tissue Integrity in Iraq: A Narrative Review

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Abstract: The definition of environment is where people live have a role in which its supports the human's health. In Iraq, the environmental stressors such arethe climate, the air pollution, prolonged sun exposure, sandstorms along with the limited access to the essential health resources which may influencing the structure as well as the function of a different human tissue. This review looks at the effects of these environmental stressors on the four basic types of human tissues: epithelial connective muscle and nervous tissue. Epithelial tissue may be affected by air, sun rays and skin irritation. Connective tissue may be influenced by malnutrition, sun rays and environmental stressors that affect bone health. Muscle tissue is very vulnerable to heat, dehydration and physical exhaustion while nervous tissue may be affected indirectly by heat stress, polluted air and sleep problems. While the biological mechanisms underlying these effects considered awell-established, the population-based studies are needed to be determine for their specific impact on the Iraqi population. A better understanding for these relationships could aim through raisingthe health awareness as well as to guide the development of the effective preventive measurements.

Keywords: *Iraq, environmental health, human tissues, polluted air, heat stress, sun rays, public health.*

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1. Introduction

The Human health is indeed closely related to the surrounding environment. The air people breathe, the water they drink, the food they eat, along with the climate they live in, it all contributes in how the body function. However, people respond differently to the environmental stressors. Factors like age, occupation, nutrition, existing health conditions, as well as access to healthcare can influence these responses [1].

Within Iraq, the environmental health represents a concern, because many areas experience a very high summer temperatures, sandstorms as well as aperiod of bad air quality. With the rapid urban growth, car exhaust, factories along with other pollution sources can be added to these dangers. Climate change is also expected to raise heat related health risks for groups [2].

The human body consists of four main tissue types: the epithelial, the connective, the muscle, along with the nervous tissue. Each of which has a distinct structure and function, but all of them depends on a stable internal environmentfor work properly. And even under a severe environmental stress, the body must work even harder to maintain this balance. If it can no longer do so, the tissue damage or the impaired function may occur [3].

This review examines how selected environmental stressors in Iraq may affect these four tissue types. Rather than assuming that the environmental exposures affect all the Iraqis within the same way, this review draws on an established biological mechanisms as well as to highlights the need for a further local research.

2. Review Approach

This narrative review draws on a public health literature that covers the environmental exposures, tissue biology, heat stress, air pollution, sun exposure, as well asthe vitamin D. Relevant information were gathered from a publications by the World Health Organization, the World Bank, the National Institutes of Health, along with the occupational health authorities, as well as the standard textbooks on the human anatomy andthe physiology.

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The main aim of this review is to explain the biological relationships within a clear academic style. It is not a review or meta analysis and it does not claim that all discussed effects have been directly proven in the Iraqi population.

3. Effects of Environmental Conditions on Epithelial Tissue

Tissue covers the surface of the body and lines many internal organs, including the respiratory and digestive tracts. It acts as a shield helping keep harmful substances and germs out of the body. It can also aid with the absorption, secretion as well as the exchange of the materials [3].

3.1 The polluted air along with the dust inhalation risk

The sandstorms as well as the airborne particles represents anenvironmental challengethroughout any parts of the Iraqi regions. When inhaling the particulate matter, which causing irritationswithin the lining of the nose, throat and even the breathing tubes. Depending on the particle size, the composition, as well as duration of the persons exposer, some particles can even reachthe lungs, in which it may triggersan inflammation as well as oxidative stress [4].

The World Health Organization (2021) identifies that the air pollution a risk factor, for the respiratory as well as the cardiovascular diseases. For the tissue levels, the repeated exposure to the irritating pollutants may impair the normal barrier function along with contributes to the airway inflammation. People who has asthma, chronic respiratory conditions, or even occupational exposure to dust, may be particularly vulnerable.

However, this effect depends on the concentration along with the composition of the particles, the exposure duration, as well as the individual's health. Not every sandstorm or even a brief exposure resulting in the lasting tissue damage.

3.2 High temperatures and sun rays' risks

The Iraq's intense summer heat can make the daily activities difficult as well as the increase of the risk of heat-related illness. Strong sunlight can also expose the skin to the ultraviolet (UV) radiation. These environmental stressors affect the body within different ways: the extreme heat which disrupt the temperature regulation, while the excessive UV

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exposure may damage cellular DNA, even causing accelerate skin ageing, along with the increase in the risk of skin cancer [5].

The skin's outer layer acts as the shield against these dangers. Much heat can burn the skin and repeated heavy UV can build up skin damage. Wearing clothes staying in shade and using sunscreen can lower UV harm while cutting down outdoor time during the hottest part of the day can lower heat related risks [6].

Practical ways to protect yourself are to keep dust out improve air when outdoor air is bad wear proper breathing masks at dusty jobs and shield the skin from too much sunlight. Public health teaching and air quality watching can also guide people to safer habits.

3.3 Protection of tissue

Practical ways to protect yourself are to keep dust out improve indoor air when outdoor air is bad wear proper breathing masks at dusty jobs and shield the skin from too much sunlight. Public health teaching and air quality watching can also guide people to safer habits [7].

4. Effects of Environmental Conditions on Connective Tissue

4.1 Sunlight, vitamin D and bone health

Sunlight plays a role in health. UVB rays help the skin make vitamin D, which's key for proper calcium uptake and bone building. But much UV can hurt the skin so looking for vitamin D does not mean standing in the sun without protection [8].

Not enough vitamin D can cause bone building and in serious cases rickets in kids and osteomalacia in adults. These problems damage the mineralized tissue that gives bones their strength [8].

Even though Iraq gets lots of sunlight not everyone gets vitamin D. Things like how much time people stay inside what clothes they wear, skin color, diet, age and health problems all change how much vitamin D they have. Therefore, the link between sunlight and bone health must not be seen by looking at weather [9].

4.2 Heat, hydration and connective tissue

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When it gets hot sweat makes the body lose water. If people do not drink enough dehydration can. Hurt circulation and how nutrients reach tissues. Severe dehydration can upset body work and raise the chance of heat sickness. Connective tissues need blood flow and a proper internal setting to keep their shape and fix damage. Still how everyday heat directly affects tendons, ligaments and cartilage is not clear unlike how heat stress affects the body [10]. More study is needed to find connective tissue effects from environmental exposure in Iraq.

4.3 Nutrition and tissue repair

Good food helps tissue heal. Protein gives the amino acids that build and fix body parts while calcium, vitamin D, vitamin C and other foods help bone health and collagen creation. Weather can indirectly change these results by changing food supply, outdoor play or overall health. Keeping nutrition drinking enough water and asking a doctor when a food shortfall is suspected are simple ways to help connective tissue health [11].

5. Effects of Environmental Conditions on Muscle Tissue

5.1 heat and muscle performance

Summer heat can put a lot of pressure on people who work or exercise outside. If the body gets too hot it sends blood to the skin and produces sweat to cool down. These actions are key, for keeping body temperature steady. Staying hot for a long time can harden the heart and blood vessels causing tiredness [1].

High temperature stress can lower a person’s ability to exercise. Can raise the chance of heat exhaustion. In severe situations heatstroke can damage many body parts and become life threatening. Occupational health guidance says that high environmental temperatures, exertion, not enough drinking water and not enough rest together can raise the chance of heat illness (National Institute for Occupational Safety and Health 2016). For workers in construction, agriculture, transport and other outdoor jobs in Iraq having access to drinking water shaded rest spots and work times that keep them out of the hottest part of the day can be especially important [12].

5.2 Dehydration and muscle spasms

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Sweating takes the body's water and electrolytes away. When these losses are large, dehydration and problems in body fluid control can happen. The Heat related muscle spasms may appear during the tiring work even though the cause isn't always only from the electrolyte loss [13].

People who work outdoors should drink fluids regularly take rest periods and follow rules at work. For any person who shows a confusion, collapse or other signs of the heatstroke must receive immediately emergency care, instead of just being given water as well as rest [14].

5.3 Physical activity in weather

A regular exercise strengthens muscles as well as supporting the overall health, but extreme heat casuses a physical activity more demanding as well as the increase in the risk of heat-related illness. Exercising during the cooler hours, reducing intensity during heatwaves, along with gradually adapting to hot conditions can aid in lowering this risk [15].

These precautions are particularly relevant to the Iraq's climate, although the level of risk varies with the location, season, humidity, activity level, and even with individual health.

6. Effects of Environmental Conditions on Tissue

The nervous tissue consists of neurons along with supporting glial cells, which is responsible for the movement, sensation, thinking, memory, along with many automatic bodily functions. The brain depends on a continuous supply of the oxygen and the nutrients, making it sensitive to any change within body temperature, blood circulation, as well as the body's internal chemical balance [4].

6.1 Heat stress and nervous system function

The extreme heat exposure causes an overwhelm the body's ability to regulate its temperature, within severe cases, it can causes a damage in the brain along with other organs. The heatstroke is particularly dangerous because it can alter mental status, causing confusion, seizures, or even loss of consciousness. These symptoms require an emergency medical attention [16].

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Even before development of severe illness, both heat as well asthe discomfort can interfere with concentration, sleep, along with the ability to perform demanding tasks. The extent of these effects varies among individuals as well as depends on the intensity along with the duration of heat exposure, hydration, and other factors [17].

In Iraq, where the temperatures of summer can reachs extreme levels, limiting heat exposure is important for both comfort as well as nervous system health.

6.2 Air pollution and the nervous system

The air pollution represents a well-established health risk, with the effects that can extend beyond the lungs. A research has linked certain air pollutants to a adverse effects on the nervous system health, potentially through mechanisms such as inflammation, oxidative stress, even a blood vessel damage [18].

The World Health Organization (2021) describes a range of the health effects associated with the air pollution. However, a local studiesis also needed to determine whether a specific environmental exposures are linked to the particular neurological conditions within the Iraqi population. Even dust exposure alone should therefore notassumed to be causingthe neurological disease among Iraqis.

6.3 Sleep, stress and environmental discomfort

The hot nights, noise, along with the poor indoor air quality, may disrupt sleeping. The poor sleeping may affects the attention, mood, memory, even the daily performance. These effects are relevant to the nervous system function, even when they do not indicates a direct damage to the nervous tissue [19].

For improving the sleepconditions where possible, staying hydrated, as well as limiting the unnecessary heat exposure, could aid in support sleep along with the mental performance during the periods of extreme heat.

7. A long term consequences for the population

The effects of the environmental exposure on a different tissue as well as the body systems is closely related. For an example, someone who works outdoors on a hot day, sweats heavily, the he become dehydrated, feel fatigued, along with difficulty concentrating. The

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exposure to a sandstorm also can irritate the airways, particularly among people with existing respiratory conditions. These examples illustrates how the environmental stressors can affect a several body systems at the same time [7].

The environmental risks which not equally distributed. The outdoor workers, young children, people within chronic illnesses, as well as those without reliable access to the cooling or even clean indoor air may be particularly vulnerable. The social inequalities as well as the differences within an access to the healthcare can also affect people's ability to the limit exposure or receive care [17].

The environmental conditions vary across the Iraqi region. The urban areas, rural communities, industrial regions, as well as the places affected by the frequent sandstorms which faces a different environmental challenge. The national conclusions must therefore draw on a study that account for the regional differences, occupational exposures, as well as the individual risk factors [20].

8. Recommendations

Here a several practical steps that helps in reducing the environmental health risks within Iraq:

1. Improve air-quality monitoring. The consistent monitoring of the sandstorm dust along with other pollutants would help in findingthe high-risk places as well as a guide public health advice.

2. Strengthen heat-safety measures. The outdoor workers musthave access to the drinking water, shaded rest areas, clothing as well as awork schedule,which account for extreme temperatures.

3. Promote the protectionof the skin. Such as shades, protective clothing as well asa suitable sunscreen can reduce the exposure of the UV. People must also avoid time within extreme heat.

4. Support nutrition. The public health education should explain how do vitamin D, calcium, protein along with other nutrients aidin keeping the bone as well as the connective tissue healthy.

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5. Increase awareness. The communities should be able to recognize the signs of the heat exhaustion as well asthe heatstroke, also knowing when to seek emergency.

6. Encourage research. The universities along withthe health institutions should study the links between the exposure as well as the health outcomes within different Iraqi groups, including children, older adults as well asthe outdoor workers.

9. Research, future Directions

Although the established biological knowledge aid in explaining how the environmental conditions can affect the tissues, more directed evidence from the Iraqi needed. A future study could examine whether the long-term exposure to the dust along with the air pollution associated with the changes in the respiratory health, how occupational heat exposure affects the muscle performance as well as the rates of heat-related illness, even how the vitamin D levels vary across age groups throughout the regions.

Studies could provide stronger evidence by the measuring exposure directly as well as the accounting for the factors like age, occupation, smoking, nutrition, socioeconomic status, along with existing health conditions. The longitudinal studies as well as the well-designed population surveys could help clarify these relationships,also assess whether the observed associations may be causal.

The research could help in developing the recommendations tailored for the environmental conditions as well as the Iraqi communities health needs, rather than the relying solely on the findings from other countries.

10. the Environmental conditions represents broader picture of the human health within Iraq. The extreme heat, airborne pollution, dust storms along with the ultraviolet radiation causean affectson the body through a biological pathway. The epithelial tissue can be affected by the inhaled particles as well as the exposure of the UV; the health of the connective tissue depends on a good nutrition as well as a proper vitamin D status; the muscle function can be weakened by the heat stress along with a dehydration; also the nervous system function can be affected by a severe heat illness, poor sleep as well as some types of an environmental pollution.

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At the same time, it is important to distinguish the established biological effects from the outcomes that have not been fully studied within the Iraqi population. For a better understanding of the exposure patterns, together with the public education, preventive measures, as well as further research, could even aidin reduce the environmental health risks as well as to improve the quality of life. Protecting the human's health requires both, an understanding of the body's tissues along with an awareness of the environmental as well as social conditions in which people live.

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