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HYGIENIC ASSESSMENT OF THE COMPLEX EFFECT OF METEOROLOGICAL FACTORS ON THE ORGANISM

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ANNOTATION

The article discusses how meteorological factors affect the human body not in isolation, but through a combined impact, and outlines the principles for the hygienic assessment of these effects. It examines the interrelationships between factors such as air temperature, relative humidity, atmospheric pressure, air velocity, and solar radiation, as well as their influence on the body's heat exchange, thermoregulation, and overall functional state. The article substantiates the necessity of considering the combined effect of these factors rather than relying on individual indicators when evaluating meteorological conditions. Furthermore, it highlights the importance of microclimate parameters, seasonal characteristics, and factors such as age, physical activity, and clothing in the context of hygienic assessment.

Keywords: meteorological factors, microclimate, air temperature, humidity, atmospheric pressure, air movement, solar radiation, thermoregulation, heat exchange, hygienic assessment.

INTRODUCTION

The aim of the study is to elucidate the combined impact of meteorological factors on the human body and to outline the principles for evaluating factors such as air temperature, humidity, air movement, atmospheric pressure, and solar radiation from a hygienic perspective.

The human body constantly exchanges heat and substances with the external environment. Meteorological conditions in the environment directly influence these processes. Meteorological factors refer to the physical properties of the atmosphere, including air temperature, humidity, air velocity, atmospheric pressure, and solar radiation. Although these factors can affect the body individually, their combined effect is often what matters most in practical hygiene.

For instance, when high air temperature coincides with high humidity, sweat evaporation is hindered, potentially reducing the body's heat dissipation. Conversely, increased air movement accelerates heat exchange. In cold conditions, strong air movement can intensify heat loss, whereas in warm conditions, it can enhance evaporation. Therefore, it is essential to consider the interplay of these meteorological factors when conducting a hygienic assessment.

Research objectives:

1. To explain the concept of meteorological factors and their main types.
2. To characterize the impact of meteorological factors on the body's thermoregulation.
3. To elucidate the interrelationship between air temperature, humidity, and air movement.
4. To demonstrate the hygienic significance of atmospheric pressure and solar radiation.
5. To outline the practical importance of a comprehensive hygienic assessment of meteorological conditions.

Meteorological factors affect the human body in an interconnected manner. Air temperature, relative humidity, air movement, atmospheric pressure, and solar radiation influence the body's

thermoregulation and heat exchange processes to varying degrees. Therefore, when hygienically assessing meteorological conditions, it is essential to consider their combined impact rather than focusing on individual indicators. Such a comprehensive assessment is of significant practical importance for determining the comfort of the microclimate, anticipating adverse meteorological conditions, and establishing a healthy living and working environment.

MATERIALS AND METHODS

The article was prepared based on the analysis of educational and scientific materials regarding hygiene, medical ecology, and meteorology, employing descriptive, comparative, and generalization methods. The assessment focused on the relationship between meteorological factors, the human body's heat exchange, and microclimatic conditions.

Air temperature is one of the primary external factors influencing the body's heat exchange. When the ambient temperature drops, the body attempts to minimize heat loss, whereas at high temperatures, it strives to dissipate excess heat. These processes are primarily mediated by thermoregulatory mechanisms.

Relative humidity also significantly affects heat exchange. In high-temperature conditions, increased humidity hinders sweat evaporation and reduces the body's capacity to dissipate heat. Conversely, at low humidity, evaporation occurs relatively easily, though excessively dry air can cause the drying out of mucous membranes.

Air velocity influences heat exchange processes involving convection and evaporation. In a cold environment, strong airflow accelerates heat loss from the body. In a hot environment, however, a certain level of airflow facilitates sweat evaporation and aids in heat dissipation. Therefore, air movement should be evaluated in conjunction with temperature and humidity.

Atmospheric pressure is another meteorological factor that affects the human body. Changes in pressure can influence gas exchange between the body and the external environment, as well as certain physiological processes. The hygienic assessment of such changes is conducted in conjunction with the overall complex of meteorological conditions.

Solar radiation plays a significant role in shaping the thermal conditions of the external environment. Solar radiation can affect the body either directly or via reflection from surrounding surfaces. Its intensity, combined with air temperature, humidity, and air movement, alters human thermal sensation.

RESULTS

The "combined effect of meteorological factors" refers to the simultaneous, interrelated impact of multiple external physical factors on the human body. From a hygienic perspective, a single indicator does not always fully reflect whether the environment is favorable or unfavorable. For instance, varying levels of humidity and air movement at the same temperature can drastically alter the body's thermal sensation.

In a hot and humid environment, the evaporation of sweat—a primary mechanism for heat dissipation—slows down. Consequently, the body's heat load may increase. Conversely, in hot but relatively dry conditions with air movement, evaporation occurs more efficiently. In cold and windy environments, convective heat loss intensifies, increasing the risk of the body becoming chilled.

A comprehensive assessment also takes into account factors such as physical activity, clothing, age, whether the environment is indoors or outdoors, the season, and the duration of the

meteorological conditions. Therefore, a hygienic assessment should not be limited to merely recording instrument readings but must also consider their overall physiological impact on the body.

When hygienically assessing meteorological conditions, microclimate indicators such as air temperature, relative humidity, and air velocity are determined first. Where necessary, factors related to atmospheric pressure and solar radiation are also taken into account. Measurements must be conducted using reliable instruments in the appropriate settings and locations.

The data obtained during the assessment are compared against regulatory or recommended values, taking into account factors such as the room's function, the season, and the physical exertion level of the work being performed. The primary advantage of this comprehensive approach is that it allows for a better characterization of thermal comfort or discomfort resulting from the interaction of individual factors.

DISCUSSION

Analysis indicates that when assessing the impact of meteorological factors on the human body, it is important to consider air temperature, humidity, and air movement collectively. These factors influence the balance between the body's heat production and heat dissipation. Meanwhile, atmospheric pressure and solar radiation complement the overall meteorological characteristics of the environment.

A comprehensive hygienic assessment allows for a well-founded conclusion regarding whether the environment is thermally comfortable or uncomfortable for humans. This approach is of significant importance when evaluating conditions in residential areas, educational and medical institutions, industrial premises, and outdoor workplaces.

The combined impact of meteorological factors is closely linked to the body's adaptive capabilities. The same meteorological conditions may be perceived differently by different individuals; factors such as age, health status, physical activity, clothing, and the level of acclimatization play a significant role in this regard.

Furthermore, assessing meteorological conditions based on a single, short-term measurement is not always sufficient, as indicators can fluctuate throughout the day and across seasons. Therefore, when conducting hygienic assessments, it is important to consider the timing and location of measurements, as well as the duration of the meteorological conditions.

In summary, a comprehensive hygienic assessment of meteorological factors facilitates a holistic understanding of the environmental load placed on the body. Such an approach supports the selection of hygienic measures aimed at standardizing microclimates, improving working and leisure conditions, and creating a comfortable environment for people.

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