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Geological Factors and Health Problems

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Abstract: Geological factors, such as damages, can cause health determinants in people, which were a little-studied and if they have been raised on occasion, usually referred to no communicable diseases. The aim of this work, which is a more or less updated bibliography, has been to develop a holistic idea for a better understanding of a problem and force latent or potential risk that they can carry and consider scientific basis infectious diseases especially complex. In essence, the focus of ecosystem health that should be considered in terrestrial ecosystems. It also provides the basic elements for the development of new research in this field.

Keywords: Ecosystem in Health, Geological factors, Earth Risk factors.

INTRODUCTION

The Earth Sciences play an essential role in the development and welfare of humanity, because they provide information and knowledge about the processes occurring in the solid earth, the origin of the planet, the sustainable use of their resources, including water and oil, and environmental preservation [1].

At present, the study of the relationship between health and environmental factors is complex and has several points of approach, including an application of the interrelationship between economic development, industrialization, technological processes and social organization of nations.

Even more complex is able to assess the methods and events to measure environmental quality and its health effects and exposure to risk, beyond the different schemes of biological, chemical and physical by route of exposure. Addressing environmental quality should be done from the perspective of ecosystem self-regulating system of interdependent dynamic relationships between living organisms and their environment [2].

This paper addresses only part of this extensive system of relationships: the bedrock that forms the foundation of the biosphere. Trying to establish the links between lithology and conditions, be transferable or not, and to get to estimate risk areas from different geological formations, is something new that we developed primarily for the protection of human health, as geological factors can guide us to locate areas with hazardous categories and health risks.

Geological factors begin to be considered of utmost importance in the international framework for medical research, not only in the different states of the human and animal health, but also in

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establishing effective clinical diagnostics and analysis in the study of health situation.

In recent decades there has been a growing awareness that the natural environment changes occur on a scale that affects global ecologies: atmospheric systems, hydrogeological and food production have been transformed throughout the world so as to sometimes lead to the appearance (and/or reemergence) of health problems in humans and animals. Although it is recognized that natural geological factors play central role in a number of environmental health situations that affect the welfare of billions of people around the world, there is a general lack of understanding about the importance of such factors in the human and animal health by the general public, the biomedical community and public health, and the professional community and environmental geosciences. Medical geology, the science that deals with the impacts of natural geologic materials and processes on animal and human health, attempts to remedy this lack by increasing awareness about these issues in biomedical communities and geosciences, and encourage greater collaboration among disciplines in their research [3].

According to the literature, focally affects the population, whether urban or rural, a universe of physical-chemical reactions of electrical, magnetic, and gravitational radiation, which interact with the surface atmospheric electricity, air ionization, cosmic rays and ion balance of different soil types, as well, the range of variables involved in some way, either positively or negatively, in the biological processes of the human body [1, 4].

Our proposal to study geological factors as possible geo-stimulus associated health conditions, is valid from the perspective of interdisciplinary studies in health ecosystem approach.

Numerous studies have been conducted on Environment, Health and Environmental Health, but far fewer investigations [2, 5-9] that relate to the health problems of habitat, from the point of view of geo-biology and to a lesser extent, from 2000 to the present, there is a group of valuable work focused on Medical Geology with emphasis on human health.

Clearly, the relation between human health and the environment is complex. Each of the traditional and modem hazards is associated with a variety of aspects of economic and social development. Moreover, there is no single best way of organizing and viewing the development/environment/health relationship that reveals all of the important interactions and possible entry points for public health actions. Several descriptions of the environmental health causal pathway have been proposed.

Extending from these, and recognizing the links between development, environment, and human health (and the need for specific "actions" at each step), a comprehensive framework can be devised (Figure 1) [10].

The aim of this work has been to prepare a review of the current literature to develop a comprehensive concept for better understanding of the problem of geological activities and the potential risk that could lead to infectious diseases, especially complex, on a scientific basis.

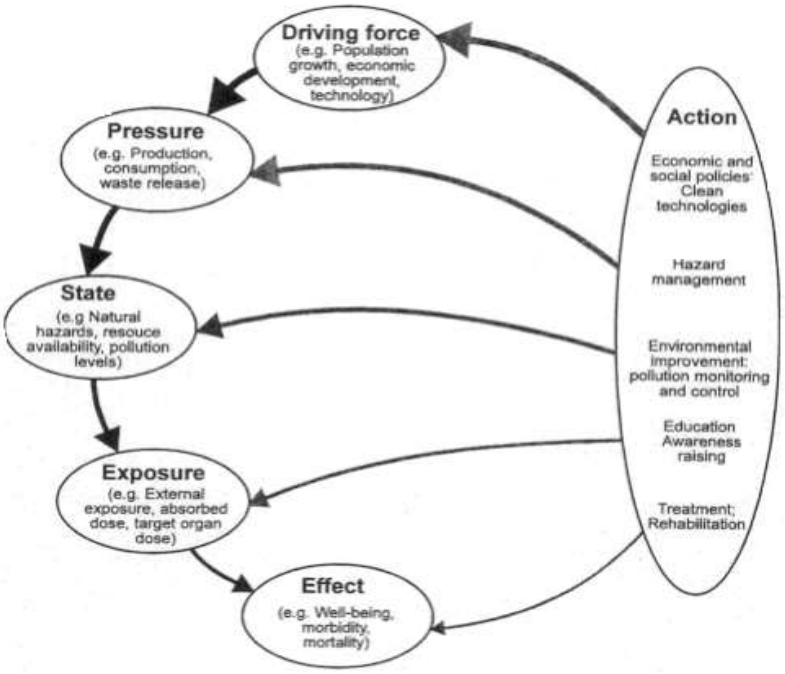

Figure 1. Health and environment cause-effect frame-work: a simplified diagram (modified from Briggs *et al*., 1996)

MATERIAL AND METHODS

This paper is a literature which collects, analyzes, summarizes and compares information from various sources published in magazines, books and internet web, on the subject of geological factors that can affect human health. It is a first approximation of a critical examination of the state of knowledge reported in the literature on the subject and is the basis for future studies.

RESULTS AND DISCUSSION

All the knowledge and information that have been found are too fragmented, so are summarized and tried to concentrate, which have to be favorable for geobiological sciences and medical and environmental geology. The information should be useful for some countries, so have been grouped under the focus of the health of ecosystems, which can be used to communicate updates to physicians and other health professionals on trends in various research that will generate further developments and relate work between land and health variables. Since ancient times, Hippocrates (377 BC) argued that for good medical practice, had to be aware of the properties of water and the study of places, and position relative to the Sun, where people settle, so in the past, the doctors took into account the interaction with each other's air, water and urbanized localities with different pathologies. The variable ground was also considered, as it had to be considered whether this was flat, dry, or muddy waters and abundant and if these were from marshy soil, or were from high places and rocky. With these observations, to know the times ahead would have full knowledge of each particular case and the greatest success achieved by ensuring the health of the population [11].

Andrew Voisin in his book, Soil, Grass and Cancer, compiled numerous scientific observations that relate the geological nature of the soil with the development of cancer, for example: in 1868, Haviland meant to the Medical Society of London, it was possible that the floor exercise influence on the frequency of occurrence of cancer, after examining the relationships between the frequency of this disease and the geological map of England

and Wales, and concluded that this frequency was higher in low clay soils, exposed to seasonal flooding of local rivers and, in 1902, Brand provided further that there were higher levels of cancer mortality in regions of low altitudes, subject to floods and mudslides made up with clay subsoil. By contrast, cancer is less common in the highlands, no floods, which are characterized by a porous soil, especially with older Paleozoic limestone rocks [7].

In conjunction with this research, the geo-biological thesis made its way, allowed habitat face scans, bore in mind the changes telluric [12-20], underground water flows and called geo-pathogenic or geo-pathic zones, which are closely related to the development of disease in the population.

Interaction between geo-spheres

The Austrian-born American physicist Victor Franz Hess, in 1911, found that the electrical conductivity of the Earth's atmosphere was due to ionization caused by high-energy radiation from outer space, deflected by the Earth's magnetic field and increased atmospheric ionization with altitude. A new vision of the lithosphere and the relationship with the cosmos had, because the intensity of cosmic radiation can penetrate more than 37m of water, which in terms of absorption, amount to more than 1.80 m lead [13].

This approach of interaction between different geo-spheres, to reflect on the constant radiation and cosmic energies, together with the reflection of them, contact the lithosphere and the radiation emitted by this, helping to create the right environment for development of life as we know it today. Any element that modifies the interaction energy between the biotic and abiotic factors of nature, can trigger problems related phenomena at the state of health. Klhovsky Georges, in 1928, noted that the energy that makes these vibrations provienentes of cosmic radiation inside the earth, so that any interference that disturbs the normal vibrational field, give rise to dysfunction in cell behavior, diseases organic functional consequence originate". It is evident that the conditions under which absorption occurs (by cosmic radiation of the earth), more or less modifies the existing electromagnetic field in the ground surface which, in turn, according to their conductivity, other radiation was reemitted by reflection [13]"

Sectors anomalous crustal

The anomalous sectors natural crust cover approximately 10-15% of the surface of the earth, so that man has the greater chance of living in areas known as neutral. Although anomalous areas for human and animal health are relatively low, according to some authors, there are sectors of the population who are at risk of being exposed to these areas geo-pathogenic [13].

Von Pohl estimated that 2.5% of the terrestrial surface was exposed to harmful radiation, hence the chance factor is insufficient, as these results have been corroborated by other researchers on numerous occasions and in different geographical areas. This percentage (2.5%) in the past proposed by von Pohl, despite being low, has been increased, because the incidence of abnormal soil telluric passed to urbanization because of the geological materials with construction features have been torn from natural context, going to form construction materials such as concrete, blocks and aggregates in general, which may contain harmful properties and geophysical disturbances amplify, which adds to the impact of the fields artificial electromagnetic environmental airspace [13].

This suggests that increases the likelihood of exposure and, therefore, not only a risk of noncommunicable diseases, but there must be an element of risk to be considered for infections, since in many cases it is assumed that it is visible only socioeconomic and others may also be considered important, but less viewable and

therefore little attention.For example, total inorganic contamination of arsenic (As) and fluoride (F^-) dissolved in groundwater used for human consumption, is an epidemic problem in the world [20]. Countries like Argentina, Canada, Chile, China, United States, Hungary, India, Italy, Mexico, Pakistan and Vietnam, among others, have reported the severity of water intake with As and F^- [6, 21]. The World Health Organization (WHO) and the Environmental Protection Agency of the United States (U.S. EPA) recommend a maximum concentration for arsenic in drinking water of 0.01 $mg.L^{-1}$, in the case of Mexico has set a limit of 0.025 $mg.L^{.1}$ [22]. While, in the case of F^-, the maximum recommended by the WHO, and adopted by Mexican standards, is 1.5 $mg.L^{-1}$, although the international body is considering further to reduce this limit by its harmful effects health [23].

Chronic exposure to water as concentrations significantly higher than 0.05 $mg.L^{-1}$, results in serious health problems epidermal, cardiovascular, renal, hematological and respiratory [6]. While in the case of fluoride, consumption significantly higher concentrations to 1.5 $mg.L^{-1}$, caused problems and skeletal fluorosis, increased susceptibility to developing kidney diseases and cancer [24] as well as the development affectation of human brain, reduced, among other effects, the intelligence quotient (IQ) of schoolchildren [8].

Harmful radiation, changes to health and living

In 1929, Gustav Freiherr Von Phol, studied the incidence of harmful terrestrial radiation and its relationship to cancer, concluded that radiation alterations were the instigators of this in people whose beds were located on land anomalous sectors. In 1932, Lehmann found that the electric potential of the ionic medium and air modified in soils located above ground water flow. Cody Peyre found, through the measurement of an electrometer in the beds of people dying from cancer, over a period of seven years, that the ion concentration was 10 times higher than the radiation environment and that, whatever its true nature, was linear [13].

In the decade of the 50s, Ernst Hatrmann, noted that both physical and mental health depends on where you live. Hartmann delved into the study of geomagnetic lines, and came to the following conclusion: "I can say with full awareness that in virtually all diseases localized in the course of my research, tests and measurements in which the patient had slept in same place appeared a cofactor long causal diagram clearly avoidable by geo-pathic [13]".

In 1960, Robert Endrös concluded that radiation would be mainly the result of a neutron radiation. This radiation may be due to certain native nuclear fission processes that take place within the earth and thereby cause formation of alpha, beta and gamma, which would be mostly absorbed by the earth itself, while the neutral particles (i.e., the neutron radiation), reach the Earth's surface, and affect all matter [13].

The above can be considered as factors associated to destabilize the structure and function of any living organism. Setting an example for the case of infectious diseases, these conditions can depress the immune system and create conditions to be more susceptible to attack by biological agents or facilitate mutations and recombination of biological agents that could give no explanation of why new agents or more virulent strains in some regions. In light of the current situation, we could then ask what geological, social, weather and biologically, can explain the emergence of a new pandemic strain of influenza A (H1N1) in the U.S. and not in Asia as usual?

In 1975, Wolfgang Stark, Salzburg, said: "There is ample evidence that the body's metabolic processes are bioelectrical." The electron microscope has shown that the absorption of food

via lymphatic and blood, due to a difference in polarity. The membrane consists of cells with positive and negative charge. This difference is due to the spread of food through the blood and lymph channels. This polarity is often altered in living tissues when they remain on disturbed areas geo-biological [13]".

In mid-80s, Dr. Otto Bergsmann, rehabilitation specialist, conducted a study on the probability of the existence of risk associated with the site. The research results were inconclusive and showed the existence of the constant regulatory influences arising from the installation site. One of the most significant changes in relation to the constant blood was the decreased level of serotonin (a neurotransmitter considered as a sleep aid) in the blood of subjects, caused disturbed sleep and increased stress symptoms. Bergsmann considered also that the stimuli that cause these variations in behavior caused by organic changes come from the natural electric and magnetic fields, although they cannot modify the operating energy of the body by their weakness, they are strong enough to affect and disrupt regulatory systems and referential, as they work with minimum energy, which ultimately may incur significant overhead on the physiological processes of our body [13].

It is therefore essential to continue the research in this field, in order to define and establish indicators that summarize the complex interaction of all geological factors with the environment and to establish habitual behavioral indices of radiation by different regions.

Animal behavior: changes in the terrain and areas geo-pathogenic

In 1932, Dr. Jenny, began their investigations on the response of mice exposed in geo-pathogenic zones [13] and these are found and burrow into the cage, geophysical disturbances free, however, if the cages were arranged with altered mice Sick, weight loss and aggressive demonstration came to gnaw at the bars of the cage, and after that, could have tumors, whereas control mice, placed in neutral areas, health status remained perfect, plus the survival rate of mice placed in a free zone geophysical disturbances, was much higher than those located in a disturbed area [13, 25].

Such drastic conditions of the relief, in addition to the changes of the Earth's surface, led to substantial physic-chemical changes of the geology and mineralogy of the soil and hence different responses of any living to adapt or not.

The living man suffers from similar attacks, but has not been fully studied and, therefore, the present study supported once again the need for an ecosystem approach to health.

New geological research for health

While geo-biological courses primarily emphasize groundwater and geological fractures, many other elements of the earth's crust may be involved in the organizational behavior of human beings, which are clearly defined in the various geological studies.

The study of groundwater in urbanized areas is vital, since the circulation of these waters deep in the ground near the surface produces an electric current which is easily measured on the surface of the soil, even when traveling at low speeds. This electric current could be due to the imbalance between the positive and negative of water molecules, the negative charge was trapped by the underground (positively charged) and continued the positive charges to the surface (negative polarity). Depending on the speed and the type of terrain which passes, such water release electrical potential generates an electromagnetic field located at the surface, which in turn modifies the natural field of microwave and thermal neutron radiation from the interior of the land [13].

Considering the above, the depth of the underground water streams, the radiation is higher than in the environment, which are anomalous

zones, also called geo-pathogenic to humans, according to the dose, exposure time and the response of each face exposed individual geo-physiological stimulus. Despite the comprehensive definition of medical geology, expressed in 2005 by Olle Selinus and other researchers [26-29], research concerning this discipline, has focused on the interaction of the chemical elements in the rocks and waters, and their harmful effects on human and animal health, so for some threshold work is synonymous with Medical Geology Environmental Geochemistry and Mineralogy Medical [30] and Geo-chemistry (MMG). These investigations are important and represent a highly interdisciplinary research area. Stress reactivity is complicated in mineral surfaces with biological molecules, cells and tissues in humans and other organisms. This allows setting the normal and pathological processes that involve the interaction of bioorganic molecules, species with different dissolved inorganic minerals around us. It is also necessary to try to incorporate the approach of Medical Geology, geo-biological criteria, which are generated by geologic features, from the waters and rocks (disjunctive structures, underground water courses, etc.), which are involved in the distribution and radiation energy contained in the various geological formations and interact together with environmental geo-chemistry.

We sought to establish indices that summarize the distribution of complex geological nature, allowing associations to identify risks to human health. Current research topics of Medical Geology in the world are varied, they include the following investigations: Toxic and carcinogenic potential of dust inhalation and influence toxicity mineral nanoparticles, the presence of heavy metals and their specifications in the body fluids as well as the etiology, epidemiology, pathogenesis, and genetic interactions -environment of many other infectious diseases and other geospatial methods includes [5] 30.

Applied Health Geography

There have been many regional studies on diseases in different geographic areas of our planet, covering many latitudes, in relation to the ethnic, social, etc., as in the case of Siberia, Europe, Austria, Japan and America, including areas. In many cases, we have established close relationships with complex natural and administrative regions [31, 32].

International experience in many countries on the use of geographic distributions, using mortality rates, morbidity, etc., to obtain the spatial distribution of the areas of higher or lower risk of getting some kind of disease, according with its administrative units, have produced excellent results in various research projects. The American experience, based on the use of these Atlas, provided substantial information on conflict zones from the point of view of health care and where required to be audited and resources faster [28].

In recent years, there has been considerable effort in producing multiple geographical studies of disease, highlighting the cancer in different countries, providing a multitude of maps that show the distribution of tumor incidences in different localities.

Projection ecosystem of medical research

An epidemiological design aims to unify different disciplines: Geography of Health, Geo-biology, Medical Geology, Clinic, Meteorology, Biodiversity, Microbiology, Physiology, Social Sciences and many other important, in order to achieve an ecosystem approach for better understanding of the complex processes involved in human health. The power of partnerships with different risks, just make us closer to explain some of these complex processes partially.

Also include rocky bodies that constitute different islands and archipelagos, which can be

distinguished from each other on the basis of one or more of its properties and characteristics, are parts of the novel in the study of health and various diseases. Such differences may be compositional, textural, facial, genetic, physical, chemical, or be related to age, fossil content, spatial position, among other features, which can generate specific properties in variable rock, which can influence different states of health of the population.

From a practical standpoint, the use of geological and geo-chronological unit will allow the reliable cartography (spatial represent ability), rock distributions, by municipalities and provinces of our country, where they settle populations, allowing us to assess their risks.

The study of surface geology, provides a dossier of petrophysical and geophysical factors, not well studied in terms of health issues are concerned, which may be involved directly or indirectly in the so-called ecological triad (didactic model simple), in different disease processes of diseases, whether chronic and communicable.

Strata as dimensional rock bodies, even without being fractured or pass them some waterways, present a set of properties such as: mechanical, acoustic, which involved porosity, elasticity, density, collector properties and the electrical variation in magnetic susceptibility and radioactivity, interacting as distributions modular ground, atmospheric electricity, air ionization and ion balance of different soil types. These properties appear as a reflection of the composition, structure, conditions of formation and geological history of the different types of rocks and minerals studied in the lithosphere.

Geophysics allows us to distinguish adjacent rock masses at different depths, which can interact on the ground and the atmosphere, form abnormal sectors or areas of habitat.

Linear structures inside or outside of the earth, can cause the physical properties are extended to a regional level and its effects may be more widespread, helpful to recognition of homogeneous effects where variables can be kept relatively constant.

CONCLUSION

You may say that the rocks on which we live, are sedimentary, igneous or metamorphic, differ substantially in their genesis and electrical, magnetic and radioactive, among others, and interact permanently on the surface of the ecosystem in which we live.

Geological areas with modified geophysical constants can alter the biochemical and energetic human body cells and produce chemo-electromagnetic changes that occur in the nervous system, which may also have negative implications on the endocrine and immune system of the people, among others, according to the exposure dose.

The geological study of factors associated with health problems is of great importance for the development and improvement of primary health care to a more holistic and comprehensive approach which would give the ecosystem health.

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