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Childhood acute leukemia in Guanajuato registered from a tertiary medical center

Abstract

Leukemia is a malignant disorder of myeloproliferative and lymphoid cells, and leads to the most frequent childhood cancer and the leading cause of infant mortality in Mexico and the World. Mexico has highest incidences and mortality of childhood by ALL compared with other countries. Believed that pollution environmental factor such as fine hydrocarbon particle and chemicals such as pesticides could be involved in the incidence of acute leukemia. Objetive: Study shows the incidence of children with ALL and AML in Guanajuato, Mexico in relation to the cities most polluted with particles smaller than PM101 suggest that chronic exposures of about 85 current chemicals products present in the environment may be explain from 7% to 19% of the cases of cancer in the inhabitants, where the child population is the most sensitive. The risk of having a population with ALL and AML is high considering that at least 16 of 46 municipalities in Guanajuato are at high risk of developing leukemia in the child population, furthermore, there are at least 21 municipalities with moderate risk. According to the report of WHO, in Guanajuato we have 4 cities with high pollution by PM10: Salamanca (80), León (58), Irapuato (55) y Silao (51). We believe that in addition to the genetic background in the population, pollutants derived from petroleum and agricultural chemicals have participated in leukemia in the Mexican population.

Keywords: leukemia, lymphoid cells, malignant disorder, environment, cancer, children, adolescents, Hispanics groups, erythrocytes, oxygenate, energy exhaustion, healthy cells, carbon dioxide, blood cells, household chemicals, environmental exposure

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Abbreviations: ALL, acute lymphoblastic leukemia; AML, acute myeloid leukemia; HRAE, hospital regional de alta pspecialidad del bajio

Review

Leukemia is a malignant disorder of myeloproliferative and lymphoid cells and leads the most frequent cancer among children and adolescents in the world, it´s the principal cause of infant mortality in the world and Mexico. In children, the Acute Lymphoblastic Leukemia (ALL) is higher incidence (80%) that Acute Myeloid Leukemia (AML); the lack of control in proliferation and maturation of cells in bone marrow leads to excess malignant cells[2,3] reports increase trends of ALL overall and among Hispanics groups was highest (42.9 per one million), plus were highest in males, children aged 1-4 years. Children with ALL may present symptoms at an early age and although it is not restricted in childhood when it occurs, the age range with highest incidence ranges from one to 10 years. The initial symptoms observed in children are marked anemia, thrombocytopenia, neutropenia, inactivity or excessive tiredness and frequently show bruising on the body. Under these conditions a small bleeding can be exacerbated and occur easily. Likewise, the loss of white blood cells responsible for fighting infections. Contribute to a weak immune system prone to mayor infections and difficult to control.

The erythrocytes have the function of oxygenate all body tissues and return the carbon dioxide to the lungs for their elimination, but in leukemia, they have a quantity or activity reduced in their functionality, furthermore they are few in number along with there being energy exhaustion. In addition, the proliferation of these defective cells is very high, in comparison with functional or healthy cells, so the mechanisms to eliminate the damaged cells were alter, causing a complex problem for the control of the disease. Knowledge about hematological diseases such as leukemia is not yet complete, as multiple factors are involved. Whit respect, to the hereditary such as genetic susceptibility, disproportionate environmental exposure to household chemicals, or parents´ exposure to chemicals at work.[3] Studies of possible causes of pediatric leukemia have been associated with exposures to solvents, traffic, pesticides, tobacco smoke, radiation or specific nutritional exposures.[4] The child population with leukemia[5] when classified as severe corresponds to the myeloid leukemia. The T phenotypes or the presence of the Philadelphia chromosome and the age at which they are present, those under 1 year old and those older than to 12 years old are at risk. Risk factors that influence the response to treatment and survival of pediatric patients are age, leukocyte count, gender, cytomorphological subtype, immunophenotype and cytogenetic type.[6]

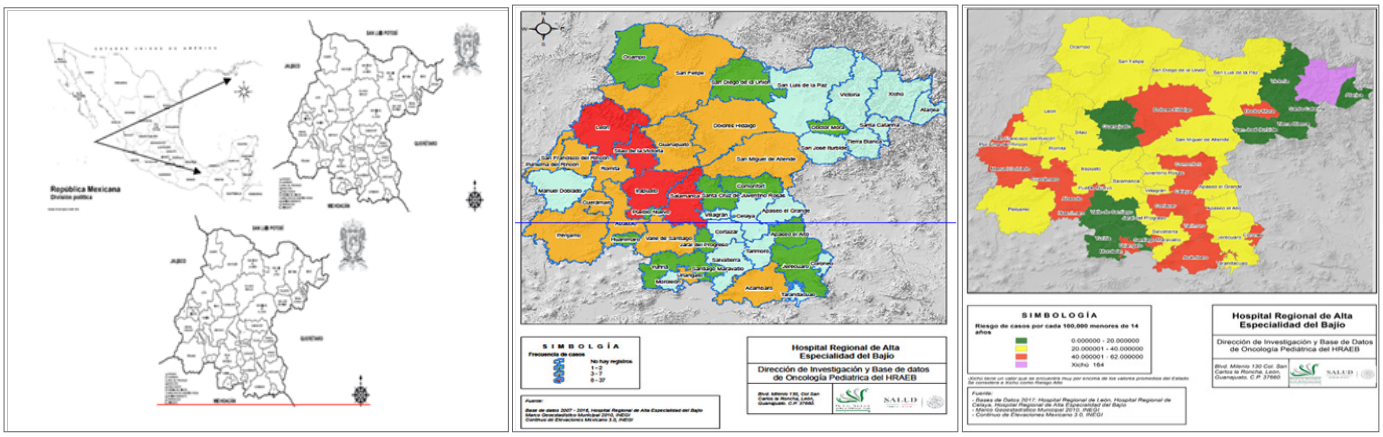
Furthermore, the study reported by[1] describes in a modern world where there has been exposure to various chemicals, hydrocarbon derivatives and various emissions to the environment. Suggest that chronic exposures of about 85 current chemicals products present in the environment may be explain from 7 % to 19 % of the cases of cancer in the population, where the childhood population is the most sensitive.[7] In addition to that, 15% of chemicals referred to,[8] that are hinging use, have proven to increase cancer in humans. However, adult people[4] are chemicals diverse exposure and risk to

AML associations with benzene, formaldehyde and vinyl chloride, and other factors for AML include increasing age, male sex, prior chemotherapy, cigarette smoking and obesity. On the other hand, chemicals exposure including creosote, soot, coal dust, fertilizers and tanning solutions were associated only with AML.

The Hospital Regional de Alta Especialidad del Bajio (HRAEB) in León, Guanajuato, Mexico, includes the registry of 12 to 16 new diagnosis of children per year, which represents an average of 3.0 to 3.5 cases of children under 18 years old for every 100,000 habitant eligible patients with leukemia. How to recognize if the urban or rural environment has an impact as elements of risk? What factors unleash this diseases? In order to answer these questions, we were considered residence and register the location by municipality on a case by case basis. The records in the Hospital during in a time of 10 years (2008 to 2017). There were 198 cases diagnosed as ALL and AML in children, of which 96 (48.48%) were boys and 102 (51.51%) were girls. The spatial location of the cases in the communities where they live and their relationship with the total child population by each municipality allows us to visualize some points denominated as higher, medium and low risk. The environmental context accords in an area with impact by PM10 from the industrial zone by hydrocarbons, as well as the emission of agricultural chemicals, paints, solvents and tannery wastes, we believe that there is influence in the parents of children diagnosed by ALL and AML, coinciding in Guanajuato four of the cities with this pollution: Salamanca (80), León (58), Irapuato (55) y Silao (51).

The HRAEB in addition to giving attention to cases of ALL and AML in a part of the child population of the so-called Bajio zone we are interested in elucidating factors not only hereditary, but those that we are able to control or minimize. We were suggest influence of petroleum hydrocarbons products with non-occupational sources of exposure exist, this support another reports about this problematic in different populations of children and adults.[1–4] In addition, we must recognize that urban centers and population growth in a large majority end up surrounding the industrial centers, which in turn has increased the exposure to waste, or air pollutions. In human beings and living animals, in this case also suspect infectious vectors by pets,[9] we have mechanisms that protect us from external factors, have repair systems for damages, defects, or removal of macromolecules that have suffered severe damage. However, these mechanisms appear to have a finite repair function, which, in turn bring damaged molecules indefinitely, and at some point will been integrated together with normal molecules; these assumptions in part would explain cases of leukemia in only a few years after birth.

When cells are damaged by a harmful environment, are added factors that accelerate cellular dysfunction and cause their discordant manifestation in an obvious way, which the mechanism in not able to repair.[10] Currently, study had been developed to capture these ideas in children with ALL and AML that are located in the places of residence with incidence rates of industry pollutions, or agricultural chemicals, the highest risk populations are shown in red color, followed by the medium risk in yellow and the low risk in green color.[11] suggest that Mexican children with ALL or AML showed ethnic and environmental factors that explain the incidence and mortality rates observed in Mexican children higher than other countries.[12] confirm highest and prevalence of leukemia especially from 0 to 4 years. Observed this dimensional study map of the Guanajuato State (Figure 1A-C), it can be conclude that the risk of having a population with ALL and AML is high considering that at least 16 of 46 municipalities in Guanajuato have a high risk of developing leukemia in the children population, furthermore, there are at least 21 municipalities with moderate risk. There is still much to be done in efforts to control this disease in our child population, with which we work perspectives to minimize the effects of treatments.[13–15] Probably the presence of PM10 from hydrocarbons has been silently affecting the population of young parents or of reproductive age, now having the effect of a greater number of cases of hemato-oncological diseases such as leukemias.



A B C

Figure 1A-C Statistics probability of Acute Leukemia in children in Guanajuato State (less 18 years old).

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None.

Conflict of interest

The author declares there is no conflicto of interest.

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