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Artículo de Investigación

ORAL DISTURBANCES ASSOCIATED WITH POISONING RISK AND PESTICIDES IN HUMAN SALIVA

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ABSTRACT

In Venezuela the pesticides have been marketed and applied indiscriminately by farmers. Those facts along with the lack of evaluation and monitoring cases of poisoning have aggravated the situation of population health. An important strategy for solving the problem is to have a premature diagnostic method, easy-to-manage, accessible economically and non-invasive to the human body. **Objectives**: the researchers seeks to offer health workers, farmers and the general population, a diagnosis method to classify the alterations oral associated with risk factors and poisoning by organophosphate and carbamates pesticides, determined by a chemical colorimetric test. This test will allow determining inhibition levels of the acetylcholinesterase enzyme present in human saliva, which is a phenomenon associated with poisoning pesticides in the body. **Methods**: this research was experimental with a of cross-section analytical component with individuals exposed. The population was formed by 12,500 individuals, from which we took a sample of 177 people. An oral examination was performed to detect nicotinic alterations, muscarinic or neurological, as well as other not associated diseases. Samples of saliva, venous blood and oral mucosa cells were analyzed to perform validation of salivary test. **Results**: percentages of AChE inhibition increases progressively, the higher were for the group of over 70%. Authors found 156 (89.14%) people with percentages of AChE inhibition over 20% which indicates a state of intoxicated. Oral disturbances related with muscarinic syndrome (67.35%), nicotinic (77.78%) and neurological (64.21%), as well as congenital disorders (72.22%) presented greater association with risk factors. **Conclusion**: A significant association at 0.05 Chi-square was found with relation to risk factors analyzed as a whole. Significant statistical relationship between oral disturbances with the percentages of AChE inhibiting and the individual intoxicated condition with pesticides could not be established. You may be required to increase the sample size for most significant relationships.
MeSH: Diagnosis, Enzymes, Saliva, Poisioning.

ALTERACIONES BUCALES ASOCIADAS AL RIESGO DE INTOXICACIÓN Y PLAGUICIDAS EN SALIVA HUMANA

RESUMEN

En Venezuela los plaguicidas han sido comercializados y aplicados de manera indiscriminada por los agricultores. Esto, junto a la falta de evaluación y monitoreo de los casos de intoxicación, ha agravado la situación de salud de la población. Una estrategia importante para dar solución al problema es disponer de un método de diagnóstico prematuro, de fácil administración, accesible económicamente y no invasivo al organismo humano. **Objetivos**: La investigación pretende ofrecer a los trabajadores de la salud, los agricultores y la población en general, un método de diagnóstico para clasificar las alteraciones bucales asociadas los factores de riesgo de intoxicación y con los niveles de plaguicidas organofosforados y carbamatos en el organismo humano los cuales serán determinados por una prueba colorimétrica sialoquímica. Esta prueba permitirá evaluar los niveles de la inhibición de la enzima acetilcolinesterasa presentes en saliva humana, que es un fenómeno asociado con intoxicación por plaguicidas. **Métodos**: Esta investigación es de tipo experimental con un componente analítico de corte transversal y fuente viva o de campo. La población analizada fue de 12.500 personas de las cuales se tomó una muestra de 177 personas. Se practicó un examen bucal para detectar alteraciones nicotínicas, muscarínicas o neurológicas, así como otras enfermedades no asociadas. También se tomaron muestras de saliva, sangre venosa y células de la mucosa bucal para realizar la validación de la prueba salival. **Resultados**: los porcentajes de inhibición de la AChE aumentan progresivamente siendo más elevados el grupo de 70 y más por ciento. Se encontraron 156 (89,14%) personas con porcentajes de inhibición de la AChE por encima del 20%, lo cual indica una condición de intoxicado. Las alteraciones bucales relacionadas con el síndrome muscarínico (67,35%), nicotínico (77,78%) y neurológico (64,21%), así como las alteraciones congénitas (72,22%) presentaron mayor asociación con los factores de riesgo. **Conclusión**: Se encontró una asociación significativa en el nivel de 0,05 chi-cuadrado con relación a los factores de riesgo analizados en su conjunto. No se encontró relación estadística significativa entre las alteraciones bucales con respecto a los porcentajes de inhibición de la AChE y la condición de intoxicados con plaguicidas.
DeCS: Diagnóstico, Enzimas, Saliva, Intoxicación.

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INTRODUCTION

Pueblo Llano, State of Mérida, is a municipality in the Andean region of the Venezuelan Paramo, where agriculture is the dominant economic activity. Improper use of agrochemicals in agricultural activities exposes all inhabitants to the toxic effects of pesticides. Two of the most commonly used in the community of Pueblo Llano agrochemicals are organophosphates and carbamates. These pesticides are biodegradable, poorly soluble in water and very fat-soluble substances that produce serious social and environmental impacts: they generate pollution of soil, air, water; affect farmers' health and agricultural works; as well as consumers as they can contaminate food.

Research seeks to offer to the dentist, health services staff and communities, a tool that will help them to identify early signs and mouth symptoms associated with poisoning from organophosphorous and carbamates pesticides. Health professionals may confirm his presumptive diagnosis using a non-invasive test in human saliva, which may be a supplementary clinical examination together with the anamnesis, which will make it possible to estimate the presence or not in the body of pesticides organophosphates and carbamates. The ultimate goal of this research is to validate from the statistical point of view, a set of diagnostic criteria to classify oral disruptions associated with a colorimetric scale in human saliva to evaluate poisoning due to organophosphorous and carbamates use and risk factors present in the handling of agrochemicals for the agricultural population of Pueblo Llano community.

METHODS

This research is experimental type with an analytical component of cross-section with individuals exposed. The samples collected were separated and identified as units of study in saliva, blood and oral mucous tissue samples taken from residents in the Pueblo Llano municipality of the Mérida State. The population examined in the study community is approximately 12,500 inhabitants, from which we took an estimated statistical sample by the Central Limit Theorem and reliable timing of 242 people. The sample size was considered on the statistical parameters a 95% confidence level, an expected error of 5% and a ratio of 80% of estimation of the prevalence of disorders associated with poisoning with pesticides in a population with high risk. The sample was comprised of both genders, age 13 and over, which comply with the conditions of subjects selected for clinical analysis ages. The individuals were selected using a sampling design for conglomerates, using natural path, with a random selection of secondary stage subjects. In order to define the people conglomerates, we established a distribution in the parish from their villages, farmhouses or sectors and territorial statesman. Statistical analysis of correlation and independence of the variables was made through the application of statistical tests simple or multivariate linear regression. Control case analyses were used for the determination of the base level of acetylcholinesterase (AChE) inhibition.

Saliva samples were determined using the modified Ellman method by colorimetric UV-Vis absorption spectroscopy. Oral alterations were identified by means of a clinical examination, which consisted of an oral evaluation. A survey was developed to collect data related to risk factors present during acquisition, transport, storage, application and disposal of pesticides. Similarly, became an assessment of knowledge of respondents on pesticide poisoning and level of education of general population.

ANALYSIS OF THE RESULTS

242 samples of human saliva were collected. From those, we finally analyzed 177 individuals of whom 41 (23.2%) were under 20 years of age, 86 (48.6%) between 21 and 40 years, 41 (23.2%) between 41 and 60, and 9 (5.08%) with over 60 years of age. This population is comprised of the male gender with 91 (51.41%) individuals compared to female gender 86 (48.59%) cases.

In Table No. 1 we see that percentages of AChE inhibition increases progressively to all oral alterations, being higher among 70 and more percent inhibition. Tooth decay and periodontal disease are alterations more prevalent in the group of < 25% inhibition of the

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enzyme, while the manifestations of the nicotinic syndrome has the highest prevalence of cases in the group of 25-50 and 50-70% of enzyme inhibition.

	% of inhibition of AChE									
	< 25		25 - 50		50 - 70		70 y más		Total	
Oral disorders	N	%	N	%	N	%	N	%	N	%
Muscarinic	16	11,43	24	17,14	32	22,86	68	48,57	140	100,00
Nicotinic	4	9,09	8	18,18	11	25,00	21	47,73	44	100,00
Neurological	15	11,11	22	16,30	31	22,96	67	49,63	135	100,00
Dental Caries	21	12,50	30	17,86	34	20,24	83	49,40	168	100,00
Periodontal disease	21	12,80	28	17,07	35	21,34	80	48,78	164	100,00
Congenital disorders	15	14,56	17	16,50	18	17,48	53	51,46	103	100,00
Total	22	12,57	30	17,14	37	21,14	86	49,14	175	100,00

Table No. 1: Oral disorders according to the percentage of inhibition of AChE in human saliva. Pueblo Llano, Mérida State, Venezuela, 2010

	Intoxicated with pesticides (>20% of Inhibition of AChE)					
	Si		No		Total	
Oral disorders	N	%	N	%	N	%
Muscarinic	125	89,29	15	10,71	140	100,00
Nicotinic	41	93,18	3	6,82	44	100,00
Neurological	122	90,37	13	9,63	135	100,00
Dental Caries	149	88,69	19	11,31	168	100,00
Periodontal disease	146	89,02	18	10,98	164	100,00
Congénital disorders	91	88,35	12	11,65	103	100,00
Total	156	89,14	19	10,86	175	100,00

Table No. 2: Oral disorders according to the condition intoxicated with organophosphate and carbamate pesticides. Pueblo Llano, Mérida State. Venezuela. 2010.

	Risk Factors									
	Lack of knowledge		Risk during Transport		Risk during Application		Risk during the disposal		Total	
Oral disorders	N	%	N	%	N	%	N	%	N	%
Muscarinic	59	60,20	47	47,96	66	67,35	54	55,10	98	100,00
Nicotinic	20	55,56	19	52,78	28	77,78	22	61,11	36	100,00
Neurological	58	61,05	46	48,42	61	64,21	49	51,58	95	100,00
Dental Caries	75	63,03	52	43,70	73	61,34	61	51,26	119	100,00
Periodontal disease	75	63,56	53	44,92	74	62,71	61	51,69	118	100,00
Congénital disorders	43	59,72	37	51,39	52	72,22	45	62,50	72	100,00
Total	80	64,00	56	44,80	78	62,40	64	51,20	125	100,00

Table No. 3: oral disorders according to the risk factors of poisoning with organophosphate and carbamate pesticides. Pueblo Llano, Mérida State. Venezuela. 2010.

On the other hand, we see congenital disorders occur in larger proportion (51.46%) in the higher percentage of AChE inhibition group.

Table No. 2 shows that 156 (89,14%) people presented percentages of AChE inhibition than 20%, which includes it in a condition of intoxicated with pesticides organophosphates and carbamates. Most associated with the frequency of intoxicated with pesticides oral alterations were derivatives of nicotinic (93.18%) and neurological syndromes (90.37%).

Table No. 3 shows oral disturbances related muscarinic syndrome (67.35%), nicotinic (77.78%) and neurological (64.21%), as well as congenital disorders (72.22%) presented greater association with those detected during the pesticide application in the agricultural workplace risk factors. To establish a statistical analysis more conclusive requires increasing the sample of subjects studied from the expected value of 242 people.

CONCLUSION

Studied oral disturbances present significant association Chi-square 0.05 level with regard to risk factors analyzed as a whole, not so in the case of the relationship of oral disturbances with the percentages of AChE inhibition and the condition of pesticide intoxication.

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