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Evaluation of family farmers health with long term exposure to pesticides in a brazilian north east region: a clinical epidemiological study

Avaliação da saúde de agricultores familiares com exposição de longo prazo a pesticidas em uma região nordeste do Brasil: um estudo clínico epidemiológico

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ABSTRACT

The present study analyzed the clinical status of 1,000 farmers in the Serra da Ibiapaba, in the northwest of the state of Ceará, a region rich in plantations of different fruits and vegetables, and thus obtain data on the epidemiological profile of farmers in the region, the most used pesticides, use of personal protective equipment, most prevalent comorbidities. Men and women with long-term exposure and direct contact to pesticides were evaluated through clinical evaluation. This assessed the epidemiological condition, blood pressure, weight, height and Body Mass Index (BMI) calculation, in addition to the application of the Alcohol Use Disorder Identification Test (Alcohol Use). Among the main results, it is worth noting that 17% of the interviewees reported using Personal Protective Equipment (PPE) during the work of contact with pesticides. Among the most used pesticides and related to the degree of toxicity, 25% highly toxic and 41% moderately toxic. As for the use of alcohol and weight, it was found that 33% of farmers make improper use of it. As a result, no trend of morbidity related to long-term exposure and direct contact with pesticides was identified through the analyzes carried out, however, the mistaken use of PPE by the majority of respondents was attested.

Keywords: Agrochemicals, pesticides, clinical tests, Audit.

RESUMO

O presente estudo analisou o quadro clínico de 1.000 agricultores da Serra da Ibiapaba, no noroeste do estado do Ceará, região rica em plantações de diversas frutas e hortaliças, e assim obter dados sobre o perfil epidemiológico dos agricultores da região, os agrotóxicos mais utilizados, uso de equipamentos de proteção individual, comorbidades mais prevalentes. Homens e mulheres com exposição prolongada e contato direto a agrotóxicos foram avaliados por meio de avaliação clínica. Este avaliou a condição epidemiológica, pressão arterial, peso, altura e cálculo do Índice de Massa Corporal (IMC), além da aplicação do Teste de Identificação de Transtornos por

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Uso de Álcool (Uso de Álcool). Entre os principais resultados, vale destacar que 17% dos entrevistados relataram utilizar Equipamentos de Proteção Individual (EPI) durante o trabalho de contato com agrotóxicos. Dentre os agrotóxicos mais utilizados e relacionados ao grau de toxicidade, 25% altamente tóxico e 41% moderadamente tóxico. Quanto ao uso de álcool e peso, verificou-se que 33% dos agricultores fazem uso indevido do mesmo. Como resultado, nenhuma tendência de morbidade relacionada à exposição prolongada e contato direto com agrotóxicos foi identificada através das análises realizadas, porém, foi atestado o uso equivocado de EPI pela maioria dos entrevistados.

Palavras-chave: *Agroquímicos, agrotóxicos, testes clínicos, Audit.*

INTRODUCTION

Since 2008, Brazil is the largest consumer of pesticides in the world, according to data from the Protocol for the Evaluation of Chronic Intoxications by Pesticides of the State Health Department of Paraná [1]. Pesticides are chemical substances widely used in Brazilian agricultural production. They are toxic products that can cause effects on human health depending on how farmers are exposed to them [2-6]. In Brazil, the word 'pesticide' came to be used to describe agricultural poisons, highlighting the toxicity of these products to the environment and human health.

In the production of vegetables, legumes, fruits and flowers, insecticides of various groups are used, including organophosphates (degradable organic compound containing carbon – phosphorus bonds) and carbamates, fungicides, nematicides, herbicides, among others. Their application is practically annual due to the succession of crops produced in this segment.

One of the regions best known for the use of pesticides is the Serra da Ibiapaba, located in the northwest of the state of Ceará and consists of eight municipalities – Tianguá, Viçosa do Ceará, São Benedito, Ibiapina, Ubajara, Guaraciaba do Norte, Croatá and Carnaubal. Among the main crops in the region are the planting of sugar cane, sweet potatoes, cashews, strawberries, tomatoes and peppers, in addition to other fruits and vegetables.

In the city of Tianguá is located the Supply Center (CEASA) of the region, where most of the production of vegetables and fruits from Ibiapaba and neighboring regions are sold to various Brazilian states. As for the crops that most use pesticides, the highlights are the planting of tomatoes (29.2%), passion fruit (23.9%), peppers (12.9%), while eggplant, cabbage and pepper are among crops that had small plots.

In Tianguá, the 13th Regional Health Coordination Office is also located, being a micro-regional reference in issues related to health, as it has the largest number of establishments linked to the Unified Health System and a higher level of complexity in terms of demands. The Coordination also includes the Worker's Health Reference Center (CEREST) in Tianguá, which, like other municipalities in the Serra da Ibiapaba region, has agriculture as its economic activity, thus standing out as the main productive process in the region.

CEREST has also sought to organize work to assess the health of farmers in the eight municipalities in order to have a better understanding and data on possible effects on their health in relation to long-term exposure to pesticides (minimum one year) and with direct contact to substances, a priority group which are the grout preparers, applicators, sulfators and hose handles.

Based on CEREST's proposal, this study aims to assess the health conditions of farmers in the Serra da Ibiapaba region, with long-term exposure (at least one year of exposure) and direct contact, in the ranges ages 20 to 40 and 40 to 60 years, 60% of farmers being men and 40% women (however, in some municipalities it is possible that these percentages vary, being higher in the case of men).

The focus of this analysis is to obtain data on the epidemiological profile of farmers in the region, the list of pesticides most used by them, if workers use personal protective equipment, the most prevalent comorbidities among these workers; since long-term exposure to multiple pesticides in farmers with direct contact can determine changes in the main target organs – bone marrow, liver, thyroid, kidneys, central and peripheral nervous system – of these substances.

METHODS

Men and women with long-term exposure and direct contact to pesticides – spray mixers, applicators, sulfators and hose pullers – in the age groups 20 to 40 and 40 to 60 years were evaluated, totaling 1,000 participants, 90% of whom were men and women. 10% women. In the first phase, the regional health and agriculture secretariats, representatives of the Agricultural Defense Agency of the State of Ceará (ADAGRI), the Technical Assistance and Rural Extension Company of Ceará (EMATERCE), rural unions, local pesticide dealers, CEREST and farmers. The objective of this phase was to present the project proposal to those present and validate it with the population to be researched.

Each stage of the project was presented to the Bipartite Inter-Management Commission (CIR) of the 13th Regional Health Coordination (CRS) and validated by representatives of the eight municipalities involved in the research. Health professionals from CEREST in Tianguá and the municipalities involved were trained to conduct an epidemiological clinical interview using the research form of the Health Care Program for Populations Exposed to Pesticides at Unicamp.

The training was the responsibility of the project coordinator professor Dr. Angelo Zanaga Trapé, coordinator of the Environmental Health Area of the Collective Health department of the Faculty of Medical Sciences (FCM) of Unicamp.

Altogether, three biochemists from Tianguá Municipal Laboratory were trained to measure erythrocyte acetylcholinesterase, using the EQM method, and the equipment – portable, self-calibrating spectrophotometer – is on loan at that Laboratory. The training was the responsibility of the sanitary biologist Siomara Regina Jacobucci responsible for the laboratory of Toxicological Analysis in Biological Material (LABTOX) of the Faculty of Medical Sciences (FCM) of Unicamp.

The clinical evaluation made by filling out the clinical epidemiological investigation forms, blood pressure measurement, weight, height and calculation of Body Mass Index (BMI). The Alcohol Use Disorder Identification Test (Audit) test for alcoholism was applied.

The interviews were conducted by professionals from the Unified Health System (SUS) in the city of Tianguá under the supervision of the CEREST team in the city, and the material was collected by employees of the Clinical Cytology Laboratory (LABCITO). The results of the laboratory exams were analyzed by the CEREST-Tianguá doctor and sent to a company in São Paulo spreadsheet reporting altered or normal along with the scanned epidemiological clinical record to be consolidated by Epi info (public domain software created by CDC - Centers for Disease Control and Prevention, in Portuguese Center for disease control and prevention – focused on health in terms of epidemiology).

At the end of this stage, the results of the laboratory tests were delivered to the farmers individually and the results of the project were presented to them and the health departments in public feedback. The identification of morbidities not inferred by the participants was sent to professionals from the Primary Care teams of the Family Health Strategy of the municipalities involved in the research.

Pesticide exposures and intoxications were recorded in the Notifiable Diseases Information System (SINAN). And at the Tianguá Laboratory (CE), the following tests were performed: liver enzymes (TGO, TGP. Alkaline phosphatase, GT range, renal function, complete blood count, TSH and T4, cholesterol and fractions, blood glucose.

The Municipal Laboratory of Tianguá was responsible for the measurement of erythrocyte acetylcholinesterase, using the EQM method, and the equipment (portable, self-calibrating spectrophotometer) is on loan at this Laboratory after training the biochemists. The organization of the interview teams that went through the collections of biological material, as well as the schedule of these actions was the responsibility of the CEREST team in Tianguá, under the coordination of the occupational physician Gecimara Huybner. In the cities of Croatá and Carnaubal, 50 individuals (each) underwent a clinical interview and blood collection, while in Ibiapina, there were 100 individuals. In the cities of São Benedito, Ubajara, Viçosa do Ceará and Tianguá, in each of them, 150 individuals went through the interventions. And in the city of Guaraciaba do Norte, this number reached 200 individuals.

RESULTS

The research initially aimed to trace the epidemiological profile of farmers, however, it obtained other significant data that deserve to be highlighted, such as the use or not of Personal Protective Equipment (PPE), signs and symptoms of diseases, use / management of pesticides. Among these data, it is essential to highlight, initially, the main cultures of the region, among which stands out the planting of tomatoes, passion fruit and peppers. However, there are other vegetables and fruits that were not mentioned that are grown in the region, but in lesser quantities, they are: zucchini, chard, acerola, banana, eggplant, beet, cauliflower and cabbage. The region is basically made up of small properties, with only 4.7% devoted to agribusiness and 95.2% to family farming and sale of products in small fairs.

Equipments for individual safety

Regarding the use of Personal Protective Equipment (PPE), 17% of the sample stated that they use it, completely, during the work of contact with pesticides. Through the information contained in the pesticide exposure investigation forms, the farmers initially reported that they spray the plants using the hose, followed by a costal pump.

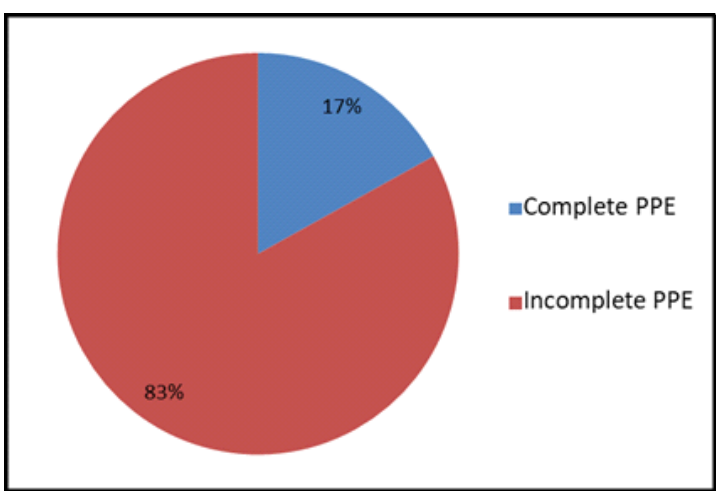


Figure 1. Percentage of farmers who have complete PPE and incomplete PPE.
Source: Projeto Agricultor Saudável (2014).

Among the pesticides most used and related to the degree of toxicity, 34% are Class I, that is, extremely toxic, 25% highly toxic and 41% moderately toxic. Insecticides being the most used class, followed by fungicides. Among the insecticides, the use of organophosphates and pyrethroids was significant, as shown in graphs 2 and 3, shown in figure 2.

Exposure time

The time of exposure to pesticides was distributed according to graph 4 (figure 3), which shows the prolonged time of exposure of the population sampled to the products. It is worth mentioning that 83% of the interviewees were exposed to pesticides in a period ranging from 1 to 20 years of exposure.

Working relationships

Almost half of the survey participants are landowners, indicating the reality of family farming in the region, as shown in Graph 5 (Figure 4).

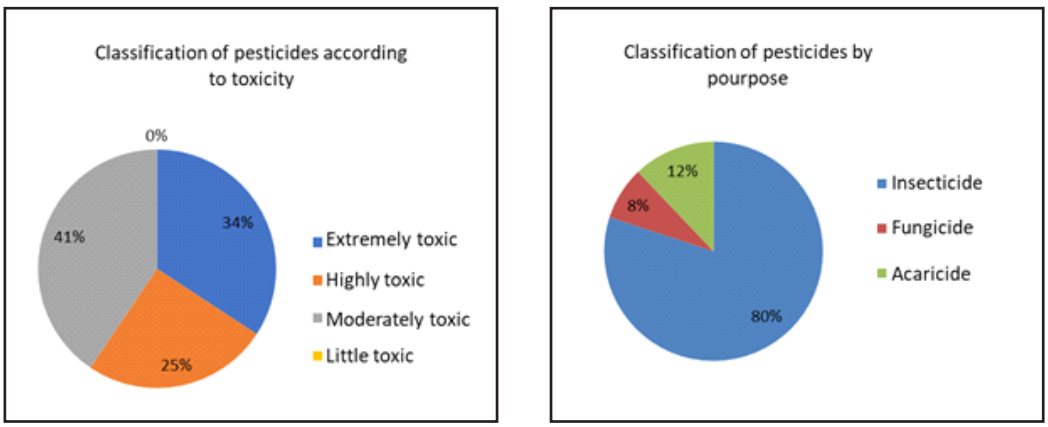


Figure 2. Classification of pesticides (Graph 2 and Graph 3).
Source: Projeto Agricultor Saudável (2014).

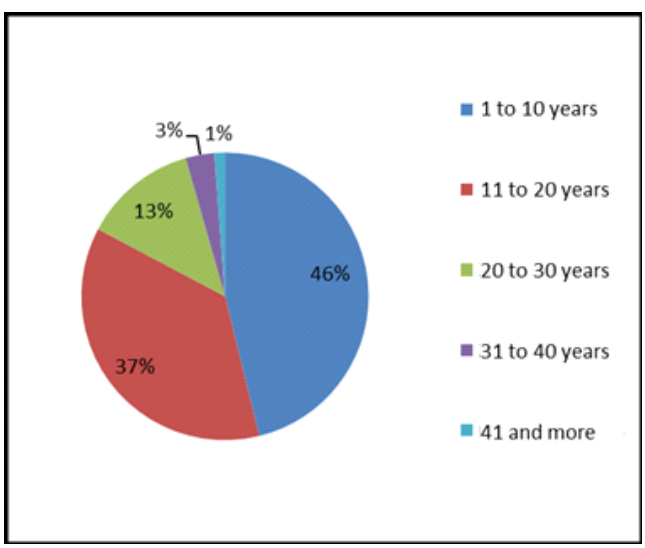


Figure 3. Time of exposure to pesticides (Graph 4).

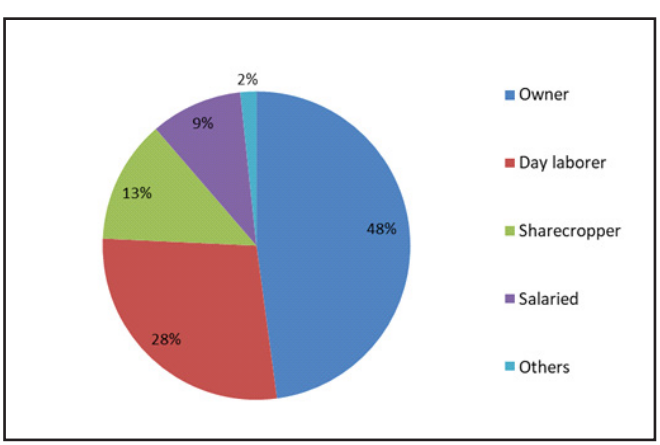
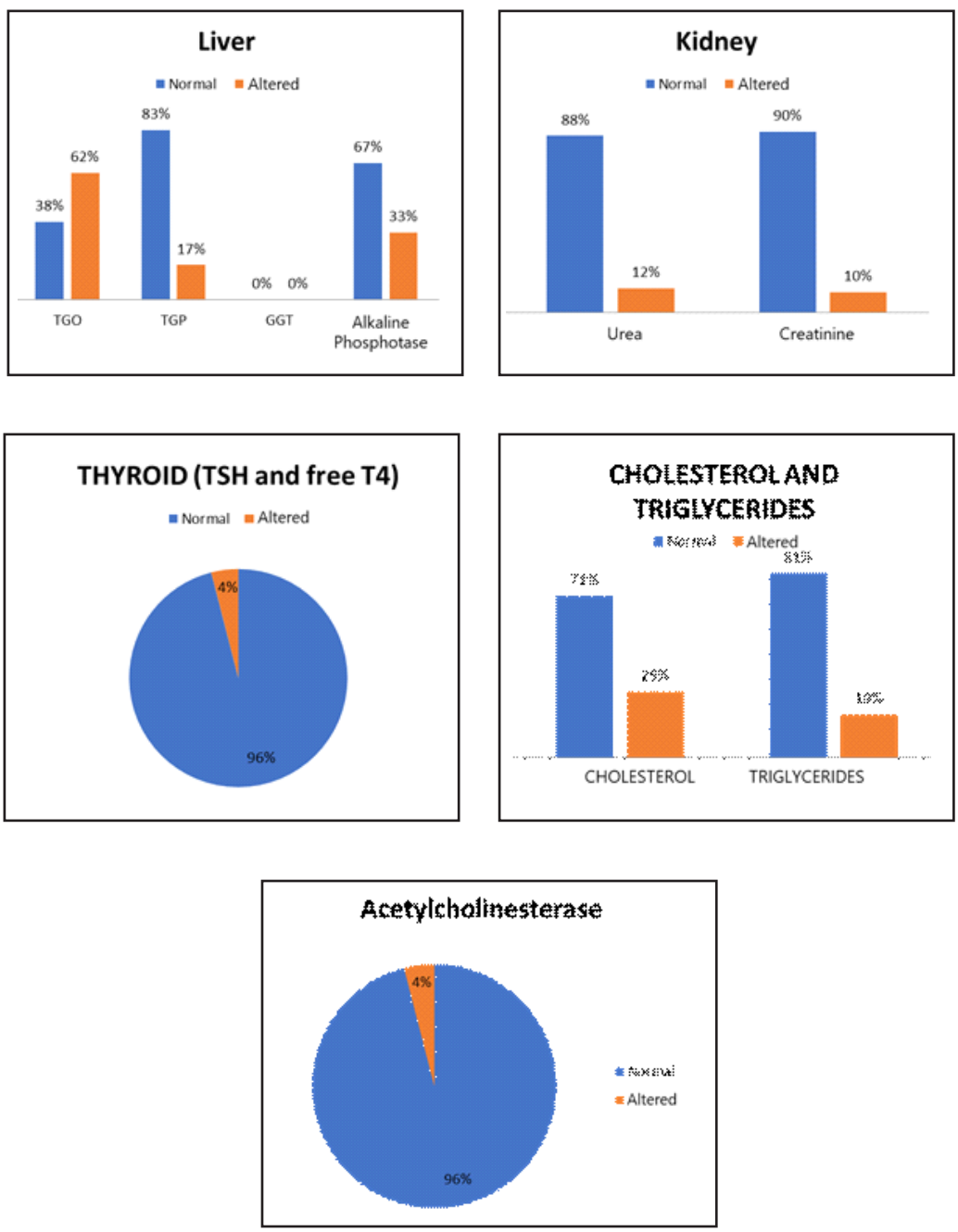


Figure 4. Working relationships (Graph 5).

Biochemical assessment

As for the use of alcohol and weight, it was found that 33% of farmers misuse it and 70% are overweight, with a BMI above 25 and 30 (recommended by the World Health Organization - WHO). The survey showed that smoking prior and current to the survey was recorded in 27% of participants. Another data raised was that 37% of the interviewed farmers had high blood pressure levels (high blood pressure), pointing to a reality that needs to be analyzed more carefully by health services, mainly with disease prevention and health promotion actions. The reference for hospitalization for acute poisoning by agrochemicals in the last 10 years was 3%, as well as the reference for seeking medical assistance for exposure to agrochemicals.

Regarding complaints reported by participants when in contact with agrochemicals, the results were as follows:



Figures 5. Biochemical assessment (Graphs 6, 7, 8, 9 and 10).

• Regarding the skin, 13% of the participants reported complaints such as itching, redness, flaking and cracking when in contact with pesticides;

• In the case of eye complaints such as itching, redness and irritation, 33% of the surveyed sample were mentioned;

• Respiratory complaints such as nasal irritation were reported by 22% of respondents;

• Dry cough, full cough and wheezing in 17% of the sample;

• Gastrointestinal complaints such as pain and burning in the stomach were felt by 43% of the sample and diarrhea, abdominal cramps, nausea and vomiting in 20% of respondents.

The results of the effect markers in the main target organs and exposure marker to organophosphate insecticides and carbamates were as follows, in the case of the liver profile, with respect to the enzymes TGO (Glutamic-Pyruvic Transaminase), TGP (Glutamic-Oxalacetic Transaminase), GGT (Gama Glutamil Transferase) and Alkaline Phosphotase, alterations were found in 38%, 17%, 18% and 33% of the individuals respectively.

DISCUSSION

The normality of the indices obtained in the liver exam indicate normality of the individual's liver functions. As for renal functions, the tests showed changes related to urea in 12% of the individuals, and in relation to creatinine, this index was 10%. With regard to the hormones TSH and free T4, only 4% of study participants showed changes in these tests.

In the case of cholesterol, the changes were noticed in 29% of farmers, and in the case of this number, it was 19%. Finally, in the last examination, the alteration of erythrocyte acetylcholinesterase was found in 4% of the sample.

CONCLUSION

From the results of the study, it is evident that it is necessary to differentiate symptoms and reaction signs to chemical exposure from intoxication by more intense exposure. The records made on the participants after a careful medical evaluation at CEREST in Tianguá concluded only one case related to exposure due to the misuse of PPE and without repercussions from the rest of the short, medium or long term, despite the prolonged exposure of the majority of the sample of participants. The morbidity findings were similar to the Brazilian population, that is, arterial hypertension, metabolic changes (overweight and obesity), alcoholism, among others, and it is not possible to establish a causal link with exposure to agrochemicals.

REFERENCES

1. Paraná. Secretaria de Estado de Saúde. Protocolo de Protocolo de Avaliação das Intoxicações Crônicas por Agrotóxicos. Curitiba, Paraná, 2013.
2. WHO, Public health impact f pesticides used in agriculture. WHO, Geneva, 128 pgs, 1990.
3. MOSTAFALOU S, ABDOLLAHI M. Pesticides and human chronic diseases: Evidences, mechanisms, and perspectives. Toxicology and Applied Pharmacology 268 (2013) 157–177
4. BRASIL. Ministério da Saúde/ Secretaria de Vigilância em Saúde/ Departamento de Vigilância em Saúde Ambiental e Saúde do Trabalhador. Documento Orientador para a Implementação da Vigilância em Saúde de Populações Expostas a Agrotóxicos. Abril de 2013.
5. KARAMI-MOHAJERI S, NIKFAR S, ABDOLLAHI M. A systematic review on the nerve-muscle electrophysiology in human organophosphorus pesticide exposure. Hum Exp Toxicol. 2014 Jan;33(1):92-102. doi: 10.1177/0960327113489047. Epub 2013 May 23. Review.
6. MACFARLANE E, CAREY R, KEEGEL T, EL-ZAEMAY S, FRITSCHI L. Dermal exposure associated with occupational end use of pesticides and the role of protective measures. Safety and health at work. 2013;4(3):136-TRAPE, AZ. Doenças causadas por agrotóxicos: um problema de saúde pública. Tese doutorado Unicamp, 1995.