



## Research Article

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### THE BEDBUG “XAMUIS” (*THASUS GIGAS*), A NEW TREATMENT FOR DIABETES OR NUTRIMENTAL CULTURE

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#### ABSTRACT

The diabetes type II is a disease in which the organism cannot produce or use insulin properly. The insulin is a hormone that transforms the sugar, starch and food in energy so that it can make use of it. Although the genetic and physical factors, such as obesity and the lack of exercise affect the health of a person, the real cause of diabetes is unknown. The objective of this study was determining the benefits that people, who suffer from diabetes type II, obtain by eating the bedbugs “Xohues” or “shamues” (*Thasus gigas*). In addition, this project intended to diagnose how this food intake affects medical treatments. An exploratory study was carried out based on a survey conducted among the residents of Actopan, Hidalgo who suffer from diabetes mellitus type II in order to investigate the intake of “xohues” or “shamues” and their adherence to medical treatment. The initial average glucose was 184 mg/dl in the interviewed people with a minimum of 33 mg/dl and a maximum of 394 mg/dl. The people had pointed out to feel better with the intake of these insects, although most of the population did not continue with the medical treatment afterwards, 5 % detachment had their medical treatment, this represents an imminent risk for the population. Insects are an important source of alimentation and a natural alternative for the treatment of diabetes mellitus type II.

**Keywords:** Diabetes type II, xohues, medical treatment, adherence, glucose.

#### INTRODUCTION

Diabetes is a disease in which the human body cannot produce or does not use the insulin correctly. The insulin is a hormone that is necessary for the transformation of the sugar, starch and other foods in energy; such energy is useful daily. Although the genetic and the environmental factors, such as the obesity or the lack of exercise, seem to affect the health leading to cause diabetes, still the origin of this disease is unknown.<sup>1</sup> There are different type of diabetes: Type I, Juvenile diabetes or Gestational Diabetes which is suffered by pregnant women and pre-diabetes is the condition where the levels of glucose in blood are above the normal, but it is not sufficiently high to diagnose the patient with diabetes. Type II Diabetes- It is very common in adults, in the past years it has become very frequent in children with obesity. In the United States, approximately 26 millions of people suffer from diabetes; unfortunately, the fourth part of them – seven millions- does not know yet that they have this illness; the other 79 million have pre-diabetes, which means that there is an elevated risk of cases of diabetes type II. Recently, estimations calculate that one over three Americans (adults) will suffer from diabetes type II by the year 2050. To determinate if a patient has latent diabetes, the health professionals perform the test of glucose in plasma in fasting (GPA), Grade Point Average, or an oral test of tolerance to the glucose (POTG) either one of these examination are useful to diagnose diabetes. The American Association of Diabetes recommends the GPA test because is more affordable, faster and easy to analyze. Using this test allows diagnosing if the level of

glucose in fasting is between 100 and 125 mg/dl. If a person has fasting blood glucose level of 126 mg/dl then the person may have latent diabetes, of higher than this one can suffers from diabetes<sup>1,2</sup>. This sickness is one of the main causes of death in Mexico; approximately 6.4 million of people were diagnosed to suffer from diabetes. The average proportion of adults who had been given a previous diagnostic is of 9.2 %\* (ENSA 2000 was 4.6 %; ENSANUT 2006 was (7.3 %). The risk of suffering from diabetes increases after being 50 years old. The States with a higher incidence of diabetic patients: Distrito Federal, Nuevo León, Veracruz, Tamaulipas, Durango and San Luis Potosi; this causes public expenses of 3,430 millions of dollars per year dedicated to the care and managing complications of this disease. The increase of physical activity, an adequate nutrition and the loss of weight, decrease the risk of developing diabetes between 34 to 43 %, this effect can remain among 10 and 20 years after finishing the diagnostic. The total of adults with diabetes could double it (according with the previous evidence of the percentage with diabetic people that do not know their condition)<sup>3</sup>. The prevalence of diabetes will be reported once the analysis of serums of the interviewed patients is completed. With reference to the proportion of adults who were given a previous diagnostic of diabetes it can be said that it was (9.2 %) slightly more than 80 % who receive treatment, 25 % present evidence of adequate metabolic control (1 in every 4 people, in the 2006 only 5.3 % of the people with diabetes had an adequate metabolic control), 13 % receive single insulin or insulin with pills (ENSANUT 2006, only the 7.3 %

receive insulin).<sup>4</sup> 16 % do not have any health protection (health services), 24.7 % therefore the risk is higher (HbA1c between 7 % and 9 %) and 49.8 % live with a very high risk (HbA1c > 9 %) of suffering complications, and 47 % were also diagnosed with high blood pressure. From the total population over 20 years, the 4.3 % live with diabetes and high blood pressure. A low percentage of the population measures hemoglobin, micro albuminuria and visits a specialist to have their foot checked (according to the established norm in the Mexican Official Standard 015- SSA2- 2010 for the prevention, treatment and control of diabetes mellitus). \*The NOM 015- SSA2- 2010 for the prevention, treatment and control of diabetes mellitus indicates that the measurements of HbA1c and micro albuminuria should be at least once per year<sup>12</sup>. Overweight and the obesity in adults: indicates the prevalence of 71.28 % (48.6 millions of people) this means; 7 of 10 Mexicans had overweight or obesity (38.8 %). In women it is 35.9 % and in men 42.5 %. The prevalence of obesity in women was 37.5 %, and in men it was 26.8 %. In School age children (5 to 11 years): the prevalence of having obesity and being overweight is 34.4 % and 19.8 % respectively. Overweight in girls 20.2 % and 19.5 % boys were observed. The prevalence of obesity in girls was 11.8 %, in boys 17.4 %<sup>1,5,7</sup>. The World Health Organization (WHO) established that there are more than 347 millions of people that suffer diabetes in the world. This organization has calculated that in year 2004, 3.4 millions of people died as a consequence of the higher levels of sugar in blood. More than 80 % of the deaths correspond to countries of low and medium income. Nearly half of the deaths happened to people who were under 70 years, and 55 % were women. The OMS foresees that the deaths will multiply by 2 between the years 2005 and 2030. The diabetes II represents the 90 % of worldwide cases that in large degree are a consequence of the excess body weight and physical inactivity. Nowadays, there are cases of children suffering from this disease. The healthy diet, regular physical activity, maintaining a normal body weight and avoiding the use of tobacco can prevent diabetes type II or delay its onset. In patients with diabetes the risk of death is two times higher

than the people without this illness<sup>5,8</sup>. The International Diabetes Federation (IDF) points out that there are approximately 371 millions of people with diabetes, but by the year 2039 this number will be increased to 552 million. Mexico ranks on the sixth place worldwide in diagnosing people with diabetes<sup>1,2,5</sup>. Frequently, the symptoms of diabetes are unnoticed because the symptoms seem harmless. Recent studies show that the early diagnosis and effective treatment decrease the chance of developing diabetes complications. Some symptoms of diabetes include: frequent urination, constant thirst, extreme hunger, unexplained weight loss, increased fatigue and weakness, irritability and blurred vision. It is recommended that if people have one of these symptoms they should contact their doctor immediately. The most common type of diabetes is the type II. The body does not produce enough insulin or the cells ignore the insulin. Insulin is necessary for the body to use sugar. Sugar is the essential fuel for the body's cells and insulin transports blood sugar into the cells. Complications like heart disease and stroke, kidney disease, eye complications, neuropathy and nerve damage, foot complications, skin complications are common in diabetics<sup>1-3,10</sup>. The bedbugs Xohues, known as bedbugs of mesquite, Xohues or Shamues (*Thasus gigas*) are insects that live in the mesquites and are traditionally eaten in the Huasteca Hidalgo. They must be fished by the head, in order to take out a stinking yellowish liquid that serves them as a defense. The preparation is similar to that of grasshoppers: it is necessary to place them in a beaker of water with lime and keep for standing. Then cook them in lemon and salt and roast those alive in the pan with a sauce. The season to consume those insects is between the months of March and May. Chahuis need to be roasted well, otherwise they retain a bitter taste, and their larvae are also appreciated. Belonging to the genre of coreidos, they are found in semiarid areas such as the Mesquite Valley where they grow in the mesquite feeding on tender leaves and green pods of it. To know more of the nutrimental content, some chemical tests were performed to the bedbug *Thasus gigas* (Xamuis), showing in Table 1, the percentage obtained in each of the tests of the different stages are represented in table<sup>6</sup>.

Table 1: Chemical analysis of the bedbug *Thasus gigas* (Xamuis)

Sample	% Protein	% Fat	% Crude fiber	% Ash
II	66.1b	23.1a	3.0b	2.0a
II	66.3b	21.3ab	4.5a	2.1a
IV	66.7b	20.4ab	4.8 <sup>a</sup>	2.2a
V	70.8a	18.8b	4.8 <sup>a</sup>	2.5a

Values with the same letter within a column are statistically equal Duncan  $\alpha = 0.05$

The bedbug *Thasus gigas* in its nymphet state<sup>2</sup> has 63 % of protein, at an adult stage it has 65.90 %, which is consistent with the data found in this work for the stage II bedbugs (66.0 %). The protein content of the Xamuis, increases as age passes, the first with less protein and the adult stage V of 70.8 %. As the results for fat, nymphet stage of 23.1 % and 19.0 % adults, edible insects are holometabolous and larval stages are very high in fat and in switching stage decreases the amount of it, which could be observed at different stages of bed bugs analyzed in

Hidalgo, therefore the edible insects also contribute to the energy, required by man every day thus allowing better protein assimilation. It is mentioned that the demand is less than 1 % of energy intake, but it is recommended that 6 % of energy intake comes from polyunsaturated fatty acids, the Xamui can provide the 6 % as previously mentioned and can provide 19-23 % of fat, depending on its state of development, which provides better benefits in terms of reducing the concentration of cholesterol and reducing the risk of atherosclerosis. Regarding the fiber,

bedbugs stage II, have 3.0 % crude fiber while for the stage V it was 4.8 % which is below than reported by Ramos, *et al* who mentioned that in the adult the amount of crude fiber is 9.95 % and in the nymph stage it is 5 %. Nymph stage<sup>1</sup> is a stage of development of an insect before reaching adulthood<sup>3</sup>. There have been few studies on the importance of this type of insects, but in other aspects it has only considered only the nutritional and anatomical facts<sup>6,9</sup>. The metabolic syndrome and obesity in general represent the precursor to type 2 diabetes, a situation that causes augmentation in this health problem globally and locally<sup>10</sup>. The prevalence of diabetes in Hidalgo was increased from 7.1 % to 19.1 % after sixty years in adults of twenty years or older. Hidalgo occupied the third place of hospitalization cases of type 2 diabetes in the trimester of January - March, 2013. It is important to mention that 3.5 % of the hospitalized cases were men and 4.3 % of the hospitalized were women<sup>11</sup>. This is why search for alternatives to treat diabetes and a better quality of life style and the suitable development this research will open new vistas.

**Methodology**

An exploratory study was conducted; surveys among residents of the community of Santiago Tulantepec and residents of the city of Actopan, both in the state of Hidalgo were asked to participate in a survey. The survey was applied to 50 people from both populations. It is important to mention that the participants suffered from Diabetes Mellitus type II and the investigation aimed to investigate the effects of Shamues or xohues intake in treatment of diabetes.

**RESULTS**

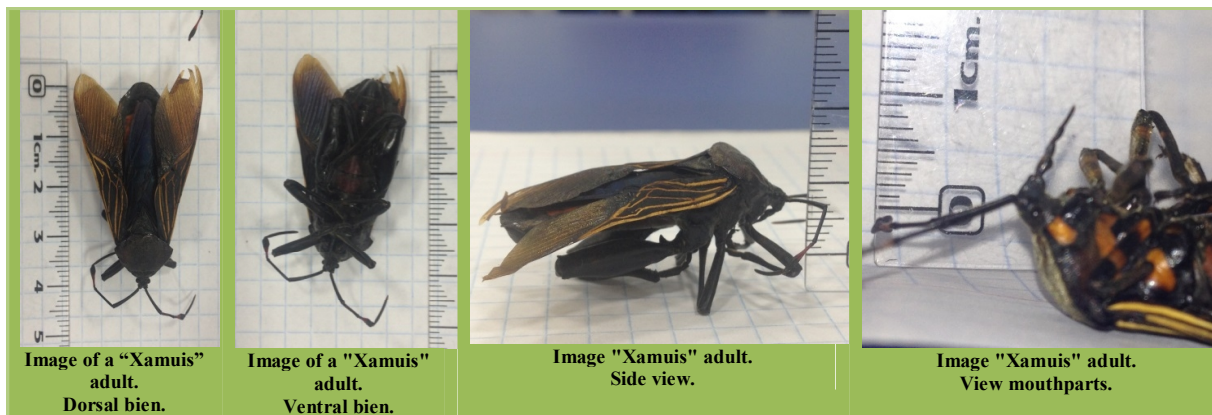
The average age of the interviewed subjects was 57 years and their initial average glucose was 184 mg/dl with a minimum of 33 mg/dl and a maximum of 394 mg/dl

(Table 2). The 50 % of the people who ingested Xamues as an alternative treatment for their disease, only 15 % have left their medical treatment and among them 5 % detachment has had their medical treatment, this represents an imminent risk for this population and 30 % consumed them for alimentary culture. It was found that the period of growth of these insects takes place during the months of June and August and during the month of September these insect are adults, and the adults are not eaten by the people, unfortunately this investigation was done during this month. The bedbugs are eaten in anymphet state, before adulthood. These insects are not common in the community of Santiago Tulantepec, Tulancingo, Hidalgo; in this place their consumption is not common. In addition, in the municipality of Actopan, Hidalgo there is a district where it is easy to eat these bugs, the style of cooking is varied and it depends on each people, however is important to clarify that the consumption is seasonal, that is why if someone visits this region in the months of September through May, they will not find these bugs. Figure 1, shows some pictures of these bugs. According to testimonies collected in Hidalgo, the bedbugs not only help for diabetes but also in some respiratory diseases. People eat Xamuies as an alternative treatment. It is worth mentioning that participants were interested on knowing the results obtained from this research.

**Table 2: Age and levels of glucose in people interviewed**

Minimum age	32 years old
Middle age	57 years old
Maximum age	81 years old
Minium glucose	33 mg/dl
Middle glucose	184 mg/dl
Maximum glucose	394 mg/dl

Source; Direct. Interview to adult people, Actopan Hidalgo, México, 2013



Ruvalcaba *et al*, 2013

**Figure 1: Photograph of bedbug Xamuis in different anatomic position**

**DISCUSSION**

The main objective of this investigation was to diagnose if the consumption of the insect mentioned above has a beneficial effect over diabetes. Although consuming such bugs might represent a risk for health but people still consume them because the positive effects on their health

are quite high. These insects have a strong resemblance to the triotomino that transmits Chagas disease which people are aware and this is probably another reason to conduct further research studies on the subject. In order to investigate the effects of those insects over diabetes type II, interviews were conducted in different cities in the

State of Hidalgo, in order to compare them. In one city the interviewed know about this bedbug, and they consume it as an alternative treatment to the disease and in the other places people even do not about this.

Moreover, glucose levels of the patients were measured so that the effects of the bug intake could be observed and determined if such effects are beneficial for the treatment of diabetes. For further studies, it would be necessary to measure the glucose levels of people who consumed bedbugs at their nymph stage in order to compare those collected during this investigation time. It is important to mention that people consume these insect in order to control glucose level and that it has been very popular. However, some people say that if they eat enough it may even cause fever in them. Therefore, the people who left their allopathic medical treatment in order to try this new alternative were exposed more to these side effects. Conducting controlled glucose tests before and after the period of intake of these insects is necessary, as well as having a controlled consumption of those insects is equally important.

### CONCLUSION

Despite all the advancements in medicine, a cure for diabetes has not been yet discovered. The data collected through the interviews showed that home remedies are popular among communities such as those in Actopan. One of the reasons why alternative and natural medical remedies are commonly used is due to the lack of access to a health insurance services and due to the lack of economical possibilities to afford allopathic medicine. Moreover, the main reason why these insects are highly consumed by the inhabitants of the communities is because they feel that their health is improved and the symptomatology of diabetes reduces.

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