Kidney Stone Disease (Urolithiasis): Epidemiological Study in the Eastern Region of Morocco

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Abstract

Background: Urinary lithiasis is a recurring pathology in the eastern region of which some forms are particularly severe and can lead to renal failure. The disease evolves with the socioeconomic level of populations, coverage health and eating habits. This epidemiological study of urolithiasis is the first in the eastern region of Morocco. It proposes to study the frequency and characteristics of this disease in this region.

Material and methods: This is an epidemiological study covering a period of five years from 2011 to 2016 in the different areas of the eastern region of Morocco. The survey was conducted using a questionnaire including 19 questions who aimed to provide each adult concerned with various information, to clarify the factors that could interfere or participate directly or indirectly in the formation of kidney stones.

Results: The results of this study showed that nephrolithiasis in adults is predominant in men and can affect at any age, with a maximum frequency between 30 and 50 years. Moreover, the majority of people who are suffering from lithiasis do not have other associated pathologies of their disease, lithiasis), do not have a history of nephrolithiasis, suffer from renal pain and are characterized by a very high frequency of consumption of animal protein, dairy products, salty foods, and soft drinks.

Conclusion: This work could serve as a basis of reflection to propose solutions to control this disease in the eastern region of Morocco.

Keywords: Epidemiology, Eastern Morocco, Nephrolithiasis, Adults.

1. Introduction

Urolithiasis has been known since the earliest times and is inseparable from the history of Humanity. Reflecting the sanitary conditions, eating habits and standard of living of the populations, the lithiasis is constantly evolving both from the point of view of its epidemiological characteristics and its etiological factors [1]. The urolithiasis term, from Greek "lithos", refers to the disease characterized by the formation and or the presence of calculus in the kidneys or urinary tract [2]. Several epidemiological factors are involved in the predisposition to lithiasis disease, like age, sex, race, climate, geographical location, occupation, diet, social class and genetic factors [3, 4]. The number of patients diagnosed with urolithiasis is progressively increasing [5]. This pathology is estimated to affect 12% of the world population with 70–80% and 47–60% recurrence in males and females, respectively [6]. In addition, the worldwide prevalence and incidence of calculi vary and have changed in the last several decades, with prevalence ranging from 7% to 13% in North America, 5% to 9% in Europe, and 1% to 5% in Asia [7]. In Australia, the incidence of urolithiasis is approximately 150 per 100,000 people [8]. However, in African countries, there were few studies about urolithiasis disease except South Africa [9]. In Morocco, an epidemiological study of urolithiasis was performed in the different departments of Hassan II Hospital in Settat, showed that the average annual rate of hospital incidence of patients suffering from urolithiasis is estimated at 30 per 100,000 (consultation and surgery) and the annual frequency varies from 0.01 to 0.5% [10]. Another study that was conducted in the Rabat-Sale area about urolithiasis showed that the overall sex ratio (men/women) was 2.03:1 and the majority of patients were aged 40 and 60 [11].
In eastern Morocco, the epidemiology of this disease is not known. That is why we report an epidemiological study of adult lithiasis patients in eastern Morocco and this through a detailed epidemiological survey, which give us information on the characteristics of lithiasis, age, sex, eating habits, and indicative signs of the disease, lithiasis pathology, and family and lithiasis antecedents. This first study constitutes a basis of reflection to appreciate the lithiasis pathology in eastern Morocco.

2. Material and Methods
This epidemiological study on urolithiasis was carried out in different regions of eastern Morocco (Zone 1: Nador and AlHoceïma, Zone 2: Berkane, Aït Hcer, and Saïdia, Zone 3: Oujda, Taourirt, Guercif and Naîma, Zone 4: Jerada and Bergent and Zone 5: Figuig, Bouarfa and Tendrara) and for 5 years, from 2011 until 2016. In this study, a questionnaire formulated of 19 questions was used (annex 1), which is intended to identify for each lithiasis adult, the various information that would determine the factors that may have intervened or participate directly or indirectly in the formation of kidney stones. Moreover, this questionnaire was addressed to 1000 patients who visited the nephrologists and urologists in eastern Morocco and after the consultation, they were found suffering from renal lithiasis. In addition, the 1000 questionnaires that were collected from the population of eastern Morocco, is a random sample, and that the total number of questionnaires taken into account is only 864, the others were eliminated because incomplete or poorly completed. Of these, only 239 were accompanied by kidney stones.

2.1 Statistical Analysis
The data questionnaires were analyzed with the Graph Pad Prism 5 Software.

3. Results and Discussion
3.1. Distribution of the Lithiasis Patients According to the Sex
This epidemiological study showed that of the 864 lithiasis identified at the survey, 59% are male and 41% are female and the sex ratio is 1.5 showing male dominance. Therefore, men and women do not have the same tendency to form lithiasis. This confirms the bibliographical data specific to other countries.

3.2. Frequency of the Lithiasis Patients According to the Age
The distribution of lithiasis in age brackets for both men and women shows that the majority of them are in the age bracket 30 to 50 years, with 267 patients (31%) between 30 and 40 years and 216 (25%) between 40 and 50 years. Thus, 155 men (18%) are in the age bracket 30 to 40 years and 138 (16.2%) are in the age bracket 40 to 50 years, while 112 lithiasis women (13%) belong to the age group between 30 and 40 while 78 (9%) between 40 and 50 years of age (Fig 1A).

These results are in line with those obtained in France [12]. However, differ from the results obtained in Federal Germany, which show that the age range favorable to lithiasis is between 55 and 59 years [13].

Furthermore, the first lithiasis occurs in 26% of cases between 20 and 30 years, in 31.4% of cases between 30 and 40 years and in 18.6% of cases between 40 and 50 years. Therefore, it reaches a maximum between 30 and 40 years (Fig 1B). Studies have shown that in the majority of cases, the age of the first lithiasis event is between 20 and 59 years, with a peak in frequency for men and women between 30 and 39 years [14].
3.3. Frequency of the Lithiasis According to the Height and the Body Weight

These two endpoints differ according to the sex, for males the majority height is between 1.6 and 1.7 meters (45.8%), as well as between 1.7 and 1.8 meters (35.3%), while for females the peak height is between 1.6 and 1.7 meters (57%) (Fig 2A). Concerning the weight of lithiasis, the findings delineate that the weight for 27.8% (16.08% males and 11.8% females) ranges from 60-70 kilograms and 24.9% between 70-80 kilograms while 22.6% among 50-60 kilograms (Fig 2B). Several factors involved in the formation of kidney stones are related to body size and weight. Generally, the larger body can be an important risk factor for the formation of calcium oxalate calculi. In addition, men are more susceptible than women to develop nephrolithiasis. A study about two large cohorts on the association between body size (height, weight, height) and the risk of calculus formation has concluded that the size and weight of the body are related to the risk of prevalence of lithiasis disease and that the magnitude of risk varies with sex. These associations are independent of age and dietary factors [15].

3.4. Distribution of the Lithiasis According to the Regions

54.3% of the lithiasis comes from the region of Oujda, Taourirt, Guercif and Naîma, 19.3% come from Nador and Al Hoceïma, 16.3% from the region of Berkane, Ahfir and Saidia, 6.4% from the region of Jerada and Berguem and 3.8% of the region of Figuig, Bouarfa and Tendrara. This difference is due to the regional variance in population density and standard of living (Fig 3).

3.5. Distribution of the Lithiasis According to the Occupation

51.3% of lithiasis patients included in this study have no work (31% female and 20% male). This category mainly includes women, older men and young men who have not yet had access to the labor market. On the other hand, 35.1% of cases have sedentary work (liberal or civil servants) with 26% are men and only 9.1% are women (Fig 4).

Of the various lithiasis patients in the series, 13.7% of cases have manual work (worker, Mason, etc.) of which 13.1% are male and 0.6% are female. Lithiasis people with sedentary work were found to be more numerous (35.1%) than those with manual work (13.7%). As has already been mentioned many works have shown that sedentary behavior promotes and increases the risk of renal lithiasis formation while manual work reduces this risk [16, 17, 18, 12]. Nevertheless, the 13.7% found are not work in itself, which normally does not favor the formation of lithiasis but rather the working conditions that favor the formation of lithiasis, working while exposed to the sun causes dehydration of the body [16]. The exposure of the body to the sun results in a stimulation of the production of vitamin D3 at the level of the skin, therefore, increases the intestinal absorption of calcium, which promotes the formation of lithiasis [19, 20, 21, 22]. Therefore, sedentary occupation and working in high temperatures increase the risk of lithiasis [12].

In Eastern Morocco, the correlation between the type of occupation and standard of living will not be obvious since unlike the European country where each person relies only on his own income, we live in a large family and 4 to 5 people can depend on one person.

Many authors have shown that exposed patients have chronic dehydration caused by a warm climate; patients who work or have a sporting activity exposed to a high temperature and with abundant perspiration or a rare intake of water have particularly a high frequency of urolithiases [23].

3.6. Distribution of the Lithiasis According to the Sports Activity

71.1% of non-sport cases in 37% are male and 34% are female, 28.9% have a sports activity with mostly 3 times a week (13.4%) and 2 times a week (12%) with always-male predominance. The majority of lithiasis people do not play sports so do not exercise physical activity, which contributes to the formation of lithiasis (Fig 5).
3.7. Distribution of the Lithiasis According to the Associated Pathologies

63.7% of lithiasis does not suffer from other pathology, both masculine (38.5%) and feminine (25.2%)(Table 1). This proves that the majorities of the renal lithiasis in the series is not a secondary cause to another associated pathology, but rather are related to environmental conditions and mainly to eating habits. 18.2% have diabetes in addition to lithiasis, 7.3% have urinary tract infection and 3.6% have diabetes associated with heart failure as shown in the following table.

3.8. Frequency of the Lithiasis According to the Presence or Absence of Revealing Signs of Lithiasis

Before realizing the presence of lithiasis, 87% of lithiasis patients had nephritic pain, while 13% had no signs (Fig 6). In fact, the nephritic colic, which is the revealing symptom of the pathology, is due to the violent stretching of the nerve fibers of the renal capsule, especially in its portion surrounding the pelvis, due to the distension of pyelocaliceal cavities upstream of the lithiasis obstacle [24]. This pain occurs brutally, often without an identifiable triggering cause, draws attention to the presence of computations in the urinary tract and therefore requires rapid therapeutic intervention. The spontaneous evolution of the colic varies with the size of the calculation and the speed of its progression in the ureter. However, when there is no revealing sign of lithiasis, for the 13% of lithiasis in this study, it may remain silent and cause progressive and irreversible alteration of the renal parenchyma, leading to the destruction of the kidney to renal failure and dialysis [19].

3.9. Frequency of the Lithiasis According to the Signs Accompanying the Lithiasis

In 65.9% of lithiasis (36.7% male and 29.2% female), kidney stones were accompanied by nephritic pain, 11.6% had at the same time nephritic pain and urinary tract infection respectively in men and women, with 7% and 4.6%.9.8% of patients had nephritic pain and hematuria; a small proportion (0.2%) had hematuria and urinary tract infections without nephritic pain (Table 2). Similarly, there were a few cases at the same time of nephritic pain, hematuria and urinary tract infections and other signs such as vomiting, nausea, and fever. The presence of urinary tract infection may be the factor responsible for the formation of the calculation, when this is not the case; it is always an aggravating factor either by promoting the growth of the calculation or by reducing its possibility of spontaneous expulsion [25]. Urinary infection associated with lithiasis can cause rapid growth in some calculations [19].

3.10. Frequency of the Lithiasis According to the Lithiasis History

61.5% of lithiasis of which 35.7% are male and 25.8% female does not have renal lithiasis in the screen, this was their first lithiasis manifestation, while 38.5% with 23% male and 15.5% of women had already deported one or more renal lithiasis. Of the 38.5% who have already had lithiasis, 67.5% expelled them spontaneously (see table), 21% by surgical removal, 6% by extracorporeal lithotripsy and 0.3% by intracorporeal lithotripsy. 1.5% of lithiasis patients eliminated spontaneous expulsion calculations and others by surgical removal and finally 0.8% of cases by different ways(Fig 7).

3.11. Frequency of the Lithiasis According to the Family History

49.9% of lithiasis patients of which 31% male and 18.5% female have no family members who suffer from renal lithiasis. While 50.1% and 27.8% male and 22.3% of females have a family history that is either descendants, ascendants or siblings, which supports the influence of diet on the formation of renal lithiasis(Fig 8). In the literature, family history is present in 30% of cases [12].
### 3.12. Frequency of the Lithiasis According to the Lithogenous Drugs
Only 53 of lithiasis both men (30%) and women (23%) take lithogenic drugs under medical prescription (Fig 9). In fact, in most of the time the lithiasis, which does have intense nephritic pains and which does not require surgical intervention. It is most often treated ambulatory without the need for hospitalization but with the use of provisional treatment by the nephrologist to calm the pain manifest.

### 3.13. Frequency of the Lithiasis According to the Water Parameters
The water normally consumed by lithiasis people before realizing their disease is in 86.3% of the cases of tap water, 9.3% consume mineral water and 2.7% well water (Fig 10A).

Once the different cases knew they were lithiasis, 79.1% have changed their drinking water to water (Fig 10B). Therefore, they are aware that there is a correlation between the quality of the water consumed and the formation of renal calculations. Instead, 20.9% did not change the usual drinking water and therefore did not see any relationship between their lithiasis and ingested water.

76.2% used water cures, so they understood that the quantity of water ingested had to be increased (Fig 10C). Indeed, the often-insufficient consumption of drinking water causes a reduction of the urinary volume, leads to urinary hyperexcretion of calcium, oxalate and uric acid, and thus constitutes the main factor in the formation of the calculations [16, 24]. On the other hand, a large intake is an initial therapy to prevent lithiasis recurrence [23].

79.1% of those who changed their usual drinking water, 16.9% and 20.4% used Sidi Ali and Sidi Harazem mineral water respectively. While 40.9% used thermal minerals water from Fezuane and 76.2% of those who practiced a water cure, 56% used thermal minerals water from Fezuane. The rest did so either with boiling water and cooling (18.7%), with Sidi Harazem (14.2%) or Sidi Ali (10.1%) (Fig 10D). So more than half of the lithiasis people used Fezuane water, the clinical experimentation of patients treated with this water confirmed, on the one hand, its diuretic activity and on the other its effect on the relief of nephritic pain and on the spontaneous expulsion of lithiasis small renal size. Drink treatment with thermal mineral water from Fezuane has been shown to be both a curative and preventive therapeutic means of renal lithiasis [26]. Therefore, the water of Fezuane, weakly mineralized and bicarbonate Calco-Magnesian, places itself in the category of water of French hydrophobes such as Evian, it has the same physicochemical characteristics [27, 26], and its action on kidney stones is mainly due to its remarkable diuretic activity.

### 3.14. Frequency of the Lithiasis According to the Animal Proteins Consumed
77.9% of lithiasis are real consumers of animal proteins (Fig 11) as well as consumption of meat, fish, and eggs with a high frequency and male predominance (47.7%). The dietary intake of animal protein was directly associated with the risk of calculus formation. and this by increasing the excretion of uric acid, calcium and lowering urinary excretion of citrate which predisposes the person to the formation of urinary stones [15, 28] especially poultry and some fish such as anchovies are very rich in purine [29]. The world map of the frequency of calcium lithiasis is largely superimposable on the map of meat consumption [30]. Moreover, the consumption of animal protein is the most important reason for calcium oxalate stone formation [31].

### 3.15. Frequency of Lithiasis According to the Consumption or no of Dairy Products and Salty Dishes
The majority of lithiasis individuals surveyed consume more dairy products (93.5%) of which 56% are male and 37.5% female with different frequencies (Fig 12A). Similarly, they are good consumers of a salted dish (88.2%) (Fig 12B).
3.16. Frequency of the Lithiasis According to the Consumption or not of Soft Drink

84.3% of patients take the soft drink (Fig 13A), knowing that they are rich in sugar that contributes to the formation of lithiasis among predisposed, 88.8% of cases do not take alcoholic beverage while 11.2% are alcohol consumers (Fig 13B). Moreover, Alcohol consumption is the most important reason for calcium oxalate stone formation [32]. In addition, Alcoholic beverages favor mainly the formation of calcium lithiasis [24].

3.17. Frequency of the Lithiasis According to the Consumption or not of Diet Change

46.6% of the cases did not change their diet after knowing that they were lithiasis when 53.4% did so they were made to work with their dietary regimen and the calculation training (Fig 14). Food survey data are valuable because food excess or imbalance and lack of beverages are the main cause of calculus formation in the most common primary calcium lithiasis today.

Conclusion
This is the first study that evaluated the prevalence and incidence of urolithiasis in the eastern region of Morocco. The results of this study indicate that the prevalence of urolithiasis was higher in males than in females (59% versus 41%). Furthermore, the majority of people who are suffering from lithiasis do not have other associated pathologies of their disease and do not have a history of nephrolithiasis, while suffer from renal pain and are characterized by a very high frequency of consumption of animal protein, dairy products, salty foods, and soft drinks. These data are important for clinical workforce planning, training, service delivery and research in the field of urolithiasis.

Availability of Data and Materials
The data used to support the findings of this study are available from the corresponding author upon request.

Competing Interest
The authors declare that they have no conflicts of interest.

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References
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Table 1: Frequencies of the various pathologies associated with the lithiasis

<table>
<thead>
<tr>
<th>Pathologies</th>
<th>Men</th>
<th>Women</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>38.5</td>
<td>25.2</td>
<td>63.7</td>
</tr>
<tr>
<td>Diabetes</td>
<td>9.4</td>
<td>8.8</td>
<td>18.2</td>
</tr>
<tr>
<td>Anemia</td>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Hepatitis</td>
<td>0.4</td>
<td>0.2</td>
<td>0.6</td>
</tr>
<tr>
<td>Heartfailure</td>
<td>1</td>
<td>0.6</td>
<td>1.6</td>
</tr>
<tr>
<td>Gout</td>
<td>0.2</td>
<td>0.1</td>
<td>0.3</td>
</tr>
<tr>
<td>Hyperparathyroidie</td>
<td>0</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Urinary infection</td>
<td>5.4</td>
<td>1.9</td>
<td>7.3</td>
</tr>
<tr>
<td>Diabetes + Anemia</td>
<td>0.2</td>
<td>0.1</td>
<td>0.3</td>
</tr>
<tr>
<td>Diabetes + Hepatitis</td>
<td>1.1</td>
<td>0.6</td>
<td>1.7</td>
</tr>
<tr>
<td>Diabetes + Heartfailure</td>
<td>0.6</td>
<td>2</td>
<td>3.6</td>
</tr>
<tr>
<td>Diabetes + Urinary infection</td>
<td>0.6</td>
<td>0.1</td>
<td>0.7</td>
</tr>
<tr>
<td>Anemia + Urinary infection</td>
<td>0.1</td>
<td>0.1</td>
<td>0.2</td>
</tr>
<tr>
<td>Gout + Urinary infection</td>
<td>0.2</td>
<td>0</td>
<td>0.2</td>
</tr>
<tr>
<td>Diabetes + Hepatitis + Heartfailure</td>
<td>0.1</td>
<td>0.5</td>
<td>0.6</td>
</tr>
<tr>
<td>Diabetes + Hepatitis + Gout</td>
<td>0</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Diabetes + Heartfailure + Gout</td>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Table 2: Frequency of various symptoms associated with the lithiasis

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Men</th>
<th>The Women</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>0.7</td>
<td>0.7</td>
<td>1.4</td>
</tr>
<tr>
<td>Nephrotic pains</td>
<td>36.7</td>
<td>29.2</td>
<td>65.9</td>
</tr>
<tr>
<td>Hematuria</td>
<td>1.6</td>
<td>0.4</td>
<td>2</td>
</tr>
<tr>
<td>Urinary infection</td>
<td>0.7</td>
<td>0.2</td>
<td>0.9</td>
</tr>
<tr>
<td>Other</td>
<td>0.4</td>
<td>0.1</td>
<td>0.5</td>
</tr>
<tr>
<td>Nephrotic pains + Hematuria</td>
<td>6.9</td>
<td>2.9</td>
<td>9.8</td>
</tr>
<tr>
<td>Nephrotic pains + Urinary infection</td>
<td>7</td>
<td>4.6</td>
<td>11.6</td>
</tr>
<tr>
<td>Hematuria + Urinary infection</td>
<td>0.2</td>
<td>0</td>
<td>0.2</td>
</tr>
<tr>
<td>Nephrotic pains + Hematuria + Infection</td>
<td>1.8</td>
<td>1</td>
<td>2.8</td>
</tr>
<tr>
<td>Nephrotic pains + Other</td>
<td>1</td>
<td>0.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Nephrotic pains + Hematuria + Other</td>
<td>1</td>
<td>0.7</td>
<td>1.7</td>
</tr>
<tr>
<td>Infection urinary + Other</td>
<td>0.4</td>
<td>0.1</td>
<td>0.2</td>
</tr>
<tr>
<td>Nephrotic pains + Infection + Other</td>
<td>0.1</td>
<td>0.1</td>
<td>0.2</td>
</tr>
<tr>
<td>Nephrotic pains + Hematuria + Infection + Other</td>
<td>0.4</td>
<td>0.6</td>
<td>1</td>
</tr>
</tbody>
</table>
Figure 1: Distribution of the lithiasis patients according to the age (A) and to the age of the first lithiasis (B).

Figure 2: Frequency of the lithiasis according to the height (A) and the body weight (B).
Figure 3: Regional distribution of the lithiasis patients (zone 1: Oujda, Taourirt, Guercif and Naïma; zone 2: Nador and Al Hoceïma; zone 3: Berkane, Ahfir and Saidia; zone 4: Jerada and Berguem; zone 5: Figuig, Bouarfa and Tendrara)

Figure 4: Frequency of the lithiasis according to the occupation

Figure 5: Frequency of the lithiasis according to the weekly sporting activity
Figure 6: Frequency of the lithiasis according to the presence or absence of the revealing signs of lithiasis

Figure 7: Frequency of the lithiasis distribution according to the presence or absence of the lithiasis

Figure 8: Frequency of the lithiasis distribution according to the presence or absence of the family history
Figure 9: frequency of the lithiasis distribution according to the lithogenic drugs consumed

Figure 10: Frequency of the lithiasis distribution according to the usual water (A), the water change (B), the changed water (C) and the water cure (D)
Figure 11: Frequency of the lithiasis according to the animal proteins consumed

1 = consumption of meat only 2 = consumption of eggs only
3 = consumption of meat and fish 4 = consumption of meat and eggs
5 = consumption of fish and eggs 6 = consumption of meat, fish and eggs

Figure 12: Frequency of the lithiasis distribution according to the consumption or no-consumption of the dairy products (A) and the salty dishes (B).
Figure 13: Frequency of the lithiasis distribution according to the consumption or not of the soft drink (A) and the alcohol (B).

Figure 14: Frequency of the lithiasis distribution according to the consumption or not of the diet change.
Annex
Annex 1:

INVESTIGATION OF RENAL LITHIASIS

Date:

N°:

1. Name: …………………

2. Age: …………………

3. Gender: …………………

4. Size: …………………

5. Weight: …………………

6. Native (city, village, district……)

7. Profession: …………………

8. Sporting activities:
   
   No □   Yes □ Frequency per week?

9. When did you realize that you lithiasis? ……………………………

10. In addition to kidney stones you suffer from one of the following diseases?

    Diabetes □
    Anemia □
    Hepatitis □
    Heart failure □
    Gout disease □
    Hyperparathyroidism □
    Urinary tract infection □

11. Before you realize that you were lithiasis, suffer from renal pains?

    No □   Yes □ since when? ……….

12. Renallithiasis accompanied by:

    Nephritic pain □
    Hematuria □
    Infections □
    Other □ Specify ………

13. Previous evictions of other lithiasis

    No □   Yes □

    Number of times □ Date of expulsion □

    Expelled by:
Surgical ablation □
Lithotritesendocorporal □
Spontaneous rejection □

14. Do you have family members with kidney lithiasis?
   Yes □    No □

15. Consumption of medicine lithogènes
   No □    Yes □    Specify…………

16. Nature of the water consumed usually
   Tap water □
   Well water □
   Mineral water □    Specify………………

17. Have you changed the drinking water since you realized that you were lithiasis?
   No □    Yes □

18. Have you ever done a cure using mineral water?
   No □    Yes □
   Name of mineral water used…………
   Period of cure……………………
   Number of lots……………………

19. Usual diet:

19.1 Animal Proteins
   19.1.1 Do you consume meat?   No □    Yes □
      Quality:
      White meat □
      Red meat □    Beef □    Sheep □    Goat □
      Frequency:    Once a day □    Once a week □    Occasionally □

19.1.2 Consume you some fish?   No □    Yes □
      Quality:
      Sardine □    Anchovy □    Other □
      Frequency:    Once a day □    Once a week □    Occasionally □
19.1.3 Do you eat eggs?  
No □  Yes □  
Frequency: Once a day □  Once a week □  Occasionally □

19.2 Consume dairy products?  
No □  Yes □  
Once a day □  Once a week □  Occasionally □
  - Milk □ □ □ □
  - Cheese □ □ □ □
  - Yogurt □ □ □ □

19.3 Do you eat salty foods?  
No □  Yes □  
Frequently □  Rarely □
  - Preserves No □ □
  - Yes □
  - Yes □  Salty dishes No □ □ □
  - Yes □  Soup No □ □ □
  - Yes □

19.4 You consume carbonated drinks?  
No □  Yes □  
Frequently □  Rarely □

19.5 You consume alcoholic drinks?  
No □  Yes □  
Frequently □  Rarely □

19.6 have you changed your diet since you realized that you were sick?  
No □  
Yes □  Specify? Animal Proteins □
  - Dairy products □
  - Salty foods □
  - Carbonated drinks □