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Study of the nutritional balance of vitamin and iron and its psychological impact on Moroccan students, in the case of the universities of Rabat, Marrakech, Tangier and Kenitra (Morocco)

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Abstract
The concept of food balance is theoretically right. The good health of the body depends on the regular intake of the various nutrients it needs. The work we have done. Given the magnitude of this behavior, including students in our universities, we proposed to conduct a survey of 1744 students of both sexes in 4 Moroccan universities: Rabat, Marrakech, Tangier and Kenitra (Morocco)
The results of this survey enabled us to profile the volunteers. Generally, female students are most threatened by malnutrition of certain nutrients, especially vitamins A, D and C and calcium. The prevalence of these students who are in a state of inadequate iron intake which probably exposes them to severe anemia is 54.8%. However, these almost insufficient intakes of these micronutrients make the students enter into a very important psychological stress behavior and especially among the students.
Faced with this alarming situation, the authorities are called upon to multiply efforts to cope with this handicap that affects students, especially those who come from far away from the University City.

Keywords: food balance, vitamins, iron, prevalence, student, stress

1. Introduction
Food consumption is a complex act, which is the subject of studies in disciplines as diverse as epidemiology, economics, sociology, anthropology or psychology, as pointed out by Poulain [1]. In addition, Erlich [2] has been very interested in the relationship between the student and his socio-economic and demographic background. She showed how these students gradually gain independence from their family and friends and adopt a new way of life and a new relational network. In addition, much work has been done on the anxiety and depression that accompanies the transition to academic life [3] and stress management [4]. The caloric intake you need depends on your gender, your age and the activities you do during the day. You need about 50% of the energy in the form of carbohydrates, 35% in the form of lipids and 15% in the form of proteins.
60% of students judge their diet is balanced. Yet 24% admit to eating no fruit, 35% no vegetables and 14%, no fruit or vegetables every day. On the other hand, they are 95% to eat between meals. In addition, 44% of them skip breakfast, the meal supposed to be the most complete and energetic of the day. 60% of them say they are not hungry or have no time to take it. More worrying: 12% of them explain this removal of a meal by financial problems Finally, to preserve a good intellectual tone, a food rich in iron that allows the transport of oxygen to the brain (egg yolks, lentils, quinoa, mollusks,...), and phosphorus (fish) will benefit you.
To this end, the research work we have carried out is part of the National Nutrition Program (PNNS) campaign, given the almost categorical lack of statistical data to guide and monitor the health policies adapted to students.

2. Materials and Methods
Data collection was done using a completed questionnaire with students leaving university campuses. The questionnaire consists of 82 questions, some of which are multiple choice, others are "open" or "closed". These allow faster data processing. The questionnaire consists of three parts:
- Information and personal elements of the student:
- Student feeding:
- Perception of food by the student:

The purpose of the questions asked is to briefly assess the student's knowledge of food in general and its impact on health.
Adding, the surveys were carried out among university students in the cities of Rabat, Marrakech, Tangier and Kenitra during the period from 28 February to 10 May 2013. The study concerns Moroccan university students aged 18-25 years. The sample consists of 55.13% female students and 44.87% male students. More than half, or 57.06%, are between the ages of 18 and 20 years.

3. Results and Discussion
3.1 Number of daily Meals according to the sex of students
It is important that you make at least three meals a day. Even if you are stressed, it is important that you take the time to eat. Meals should be synonymous with relaxation. When you are in a period of revision or examination, your body needs energy and therefore you feed properly. You will not be able to concentrate well if you have nutritional deficiencies. These periods are therefore the wrong time to undertake a possible regime.
Your body needs lipids, carbohydrates, protein, fiber, minerals

and vitamins. No food combines all this at once, which is why it is important to eat varied. A balanced meal will consist, for example, of a serving of meat, fish, eggs, cereals, soya or pulses, a starch or bread dish, vegetables, a fruit, a dairy product and 'water.

The results of the distribution of the number of meals per day for students are presented in Table 1. The mean number is 2.39 ± 0.07 meals / day, with an average of 2.16 meals / day for female students and 2.65 meals / day for male students with a minimum of 0 meals / Days and a maximum of 3 meals / day. The Fisher test showed a significant difference between the mean number of meals / day for females and males (Fisher = 12.54; p <0.001). Note that in the sample there was one student do not take any meals and other 3meals / day.

Table 1: Analysis of variance with one criterion of classification "sex" effect on the number of the taken meals in day.

	N	Mean	Erreur standard	95% confidence interval for the mean		Mini	Maxi	Fisher	P val
				Lowerbound	Upperbound				
Female	51	2.16	0.11	1.93	2.38	0.00	3.00	12.54	0.001*
Male	48	2.65	0.08	2.49	2.80	1.00	3.00		
Total	99	2.39	0.07	2.25	2.54	0.00	3.00		

N: total number; Average; Mini: minimum; Max: maximum; * : significantdifference

The distribution of the number of meals taken per day by sex is presented in the figure (1). In addition, 50% of students report taking 3 meals a day, 32% of which are male and 18% of which are female. In contrast, 31% of female students and 19% of male students reported taking less than three meals a day.

According to the Usem (National Union of Regional Student Mutuals) [5] in France, 1 in its 2016 report, 1 in 5 students consume no more than 2 meals a day, 14% do not eat fruit or vegetables, and 95% nibble between meals. According to the survey conducted by the National Student Life Observatory [6], 29.4% of boys and 23.3% of girls reported having skipped more than 3 breakfasts in a week. Similarly, a study by the student mutual society [5] points out that one-third of students regularly eats hungry after skipping a meal.

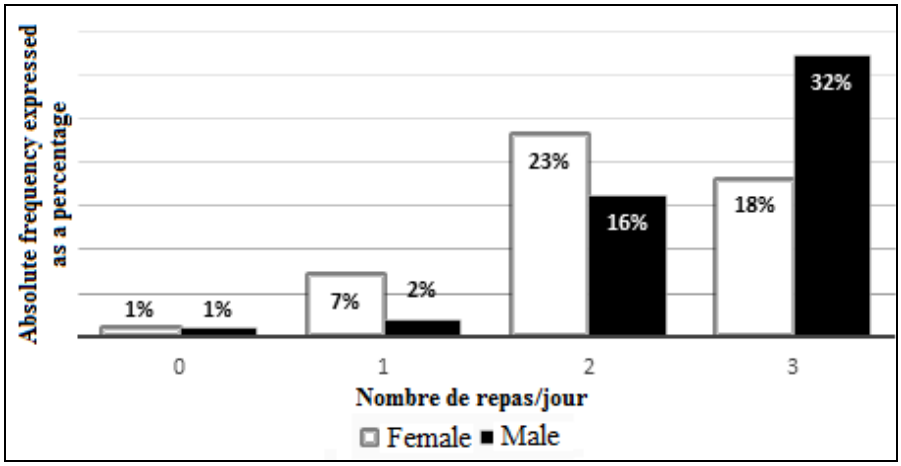


Fig 1: Distribution of surveys by number of meals taken in a day according to the individual's sex

3.2 Distribution of intakes of vitamins D, A and among students

There are a number of vitamins that your body needs. A deficiency can lead to complications such as cardiovascular diseases or digestive problems. The best way to avoid deficiencies is to eat balanced. It is possible to take supplements, but be careful because too high intake of vitamins can also prove to be harmful.

The results of the intake of vitamins D, A and C are summarized in Table 2. The chi-square test showed no significant association between vitamin intake and sex (p> 0.05). Moreover, the representativeness of the students' state according to the contribution shows that the students suffer from an insufficiency in the supply of these vitamins in comparison with the male students.

Table 2: Distribution of vitamin intakes in both sexes

vitamin		Female in %	Male in %	Khi -square	YULE	ODDS	IC
D	Insufficient	6.98	10.11	0,64 (p<0.374)	-0.21	0.65	0.23-1.87
	Normal	42.77	39.97				
A	Insufficient	35.92	33.88	0.19 (p<0.942)	0.1	1.21	0.51-2.86
	Normal	13.89	16,09				
C	Insufficient	40.04	39,00	0.06 (p<0.727)	0.06	1.13	0.43- 2.96
	Normal	9.81	11.13				

The vitamin status A and C of voluntary students were analyzed with the aim of highlighting potential deficiencies resulting from a low-fruit and vegetable diet. The calculation of the daily dietary intake shows that a deficiency in the three vitamins was observed in these students. This inadequate contribution is partly due to the low level of fruit and cooked foods taken by the students either at home or at the university restaurant.

In its ninth National Student Health Survey, released in 2015, EmeVia and the Csa Institute [7] reveal that students are far from having a balanced diet and do not engage in regular physical activity. The Student Feeding Behavior Survey was conducted among a sample of 44.269 people. It turns out that 37% of students believe they have an unbalanced diet.

3.3 Calcium intake

Calcium is important for the growth of our skeleton. It is mainly found in dairy products. As shown, Figure (2), 31.22% of female students and 26.12% of male students report insufficient calcium intake per day. The difference between the two sexes is not statistically significant (chi-square = 1.21, p> 0.05). Moreover, this difference between normal students and those with an insufficiency probably related to the living, socio-economic and demographic conditions of the latter. Financial status thus the situation away from the family and other factors allow students not to consume luxury and seeks to satisfy their food need in quantity and not to quality as it was described in its research report By Beydoum *et al.* [8]

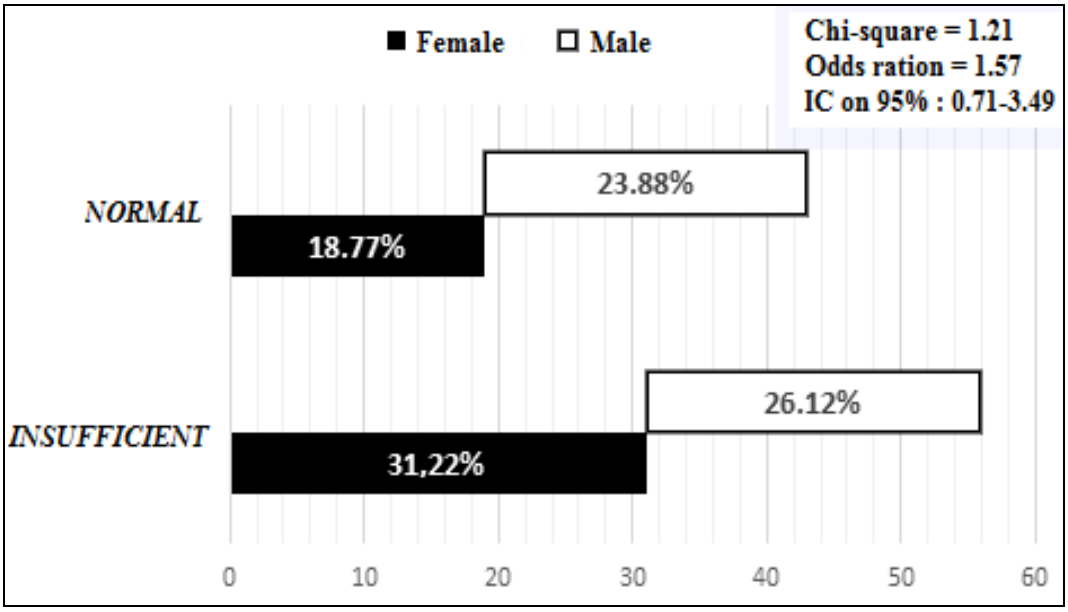


Fig 2: Distribution of the surveys according the intake calcium and the sex of the individual

3.4 Iron content

Iron deficiency can lead to anemia. You can notice it especially by the fatigue, the pallor or the fall of the hair. Some of the iron in our body is eliminated every day. It is therefore important to compensate for this loss by regular inputs. Red meat, offal, lentils, peas, beans, dried fruits and cereals are rich in iron. According to WHO [9], anemia is the most common public health problem in the world, affecting all age groups [10, 11].

Our study focuses on the iron intake of the students surveyed. The results of the analysis are shown in Table 3. The distribution of students according to sex and the state of iron intake shows a strong connection (chi-square = 46.37, p <0.000). In addition, 45.79% of cases reporting iron deficiency are female compared with only 9.01% male.

The health impact of this behavior is very high among female students. It is most likely that fatigue, loss of work capacity, and disruption of mental and cognitive development [12], memory and learning disabilities, will occur.

Table 3: Distribution of respondents according to the iron intake and the sex of the individual

	Female	Male	Khi-square	P val	YULE	Odds	IC
Insufficient	45.79%	9.01%	46.37	0.000*	0.94	33.68	10.26-110.26
Normal	4.21%	40.88%					
Total	50%	50%					

*: Significant very significant difference (p <1 per 1000); CI: 95% confidence interval. Odds ratio.

3.5 State of stress

The stress of higher education exposes them to various disorders, especially food. Such disorders, once present, could influence the image of the body and the self-esteem of young students.

The results of our study (Fig. 3) show a strong relationship between sex and the state of stress of the students surveyed (chi-square = 8.57, p <0.014). Indeed, female students were

more stressed than male students, with rates of 42.8% and 32.99%, respectively. However, 26% of these stressed students declared during the exam period compared to 23% for male students. However, the frequency of students reporting "no to stress", 18% are male and 7% are female.

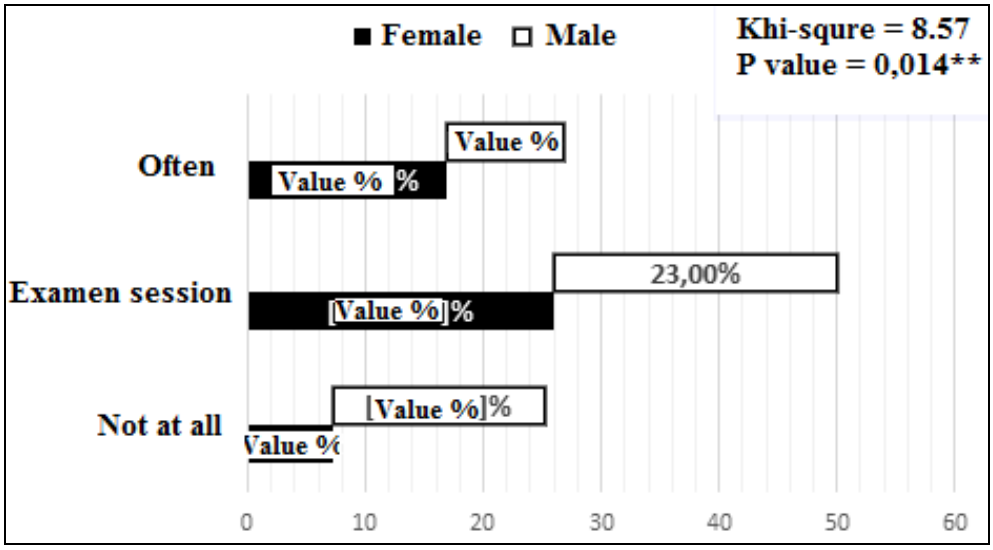
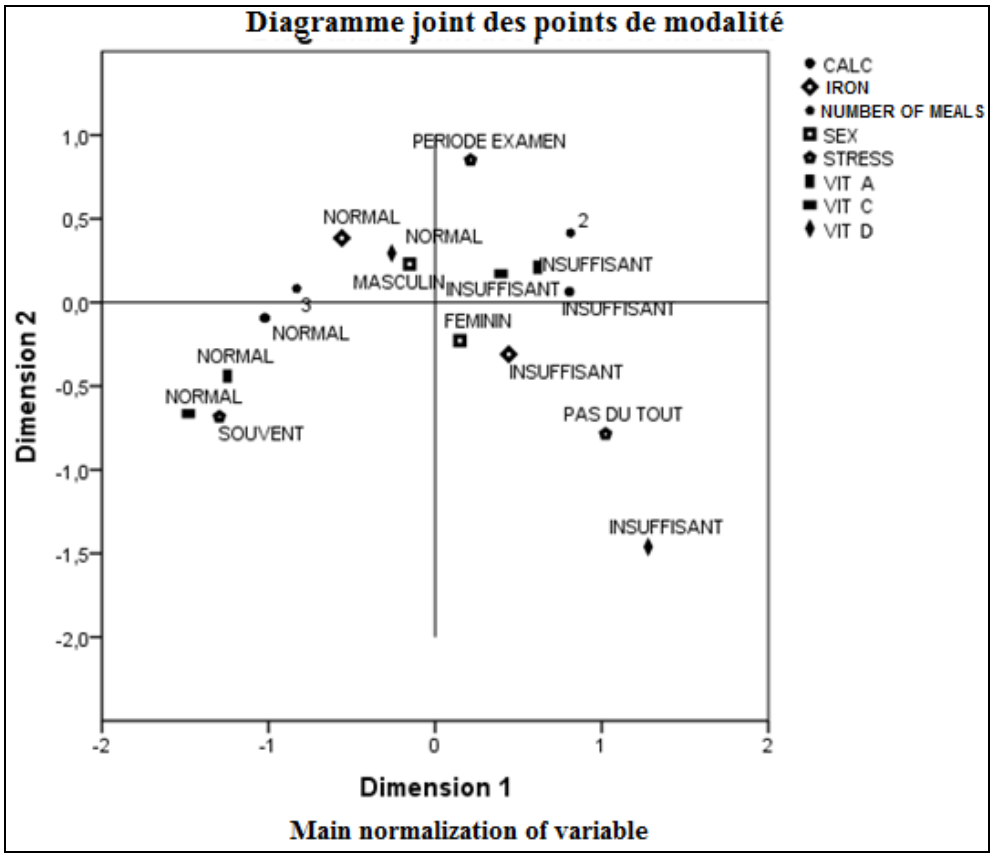


Fig 3: Distribution of students according to their state of stress



A: Vitamin A; VIT C: Vitamin C; VIT D: Vitamin D

Fig 4: Presentation in ACM of the all studied variables

To develop the factors directly or indirectly related to the various behaviors associated with poor nutrition and thus the insufficient intake of macros and microelements necessary for a health balance, we used the ACM multiple correspondence analysis. This technique is based on the exploitation of qualitative data and its principle consists in seeking the significant links between the different modalities. The results of this analysis make it possible to distinguish two distinct groups (Fig. 4):

- The first group located on the positive side of axis 1,

consists mainly of female students and showed a state of insufficiency for most of the micro and macroelements evaluated, vitamins, calcium and iron. The projection always along axis 1 confirmed that these students usually skip a meal a day. Their psychic state tends towards absolute stress and especially during the period of the examinations

- In contrast to the first axis, group 2 is characterized by students who do not suffer from any stress and who are not generally in a state of food imbalance in vitamin and calcium. Persons in this group meet the prescribed standard, three meals / day. As a result, iron intake is not a problem for them.

4. Conclusion

The behavior of malnutrition and the resulting state of stress would be mostly due to different environmental factors, namely the breakdown of family food habits. The stress of the studies is particularly present during the periods of examinations and the formations require an hourly volume of work at home high. The financial resources, although advanced by a small part of the students, are not neglected as a cause because they often have to juggle the various expenses (rent, food, leisure, studies, fuel, etc.)

Thus, it is important to become aware of the importance of one's diet, to enjoy one's eating. Multiplying meals between students is interesting because cooking for several guests is always more motivating.

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