Public Health Research 2016, 6(6): 149-156
DOI: 10.5923/j.phr.20160606.01

Prevalence of General and Abdominal Obesity on Total Population of Western of Algeria (Province of Sidi Bel Abbes)

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Abstract Background and objective: The aim of this study is to look for general and visceral obesity in the Algerian population and particularly that of the Wilaya of Sidi Bel Abbes and to compare between the two genders not only for treatment but also for prevention of such abnormality that can cause serious disturbances Patients and Methods: 772 subjects aged between 18 and 93 years old were recruited for this study including 499 women and 273 men. Our cross sectional study lasted Ten months, from April to January 2015, at the level of the Proximity Public Institutions of Health Public of the six towns in Sidi-Bel-Abbes city. Anthropometric measurement (weight, height, BMI and waist circumference) were estimated to look for general and abdominal obesity according the standards of WHO and NCEP ATP III. The statistical analysis was performed through IBM SPSS version 22. Results: The mean age in our population is 48.85±17.63 years old. Our study show that the population of the city Sidi Bel Abbes is on state of overweight with 60.70% of the population have a BMI higher than 25. We notice also that 27.9% of women are obese (BMI>30) Vs 22.5% of Men. Moreover, the study show also that the population of the six towns are overweight. We notice that the town of Ain El Berd present the highest percentage with 66.10% of the population have a BMI≥ 25 and 33.89% are obese (BMI≥30). The mean waist circumference of our population is higher only in women according the standards of NCEP ATP III. The study shows that over than 75% of women have abdominal obesity. Furthermore we notice also a highly significant difference (P<0.001) in the frequency of abdominal obesity between women and men in the sis towns of the city of Sidi Bel Abbes. Conclusion: Our study show a high prevalence of general and abdominal obesity in the northern of Algeria so we have to estimate and assess obesity in the Algerian population in order to stop it and prevent it because it can cause more serious problems.

Keywords Obesity, Visceral Obesity, Body mass index, Waist circumference, Sidi Bel Abbes

1. Introduction

Obesity has become a health problem that is propagated worldwide. This spread is due to changes in lifestyle: diet rich in sugars, fat, poor quality proteins, lack of physical activity, and psychological disturbances.

Worldwide obesity has more than doubled since 1980. In 2014, more than 1.9 billion adults, 18 years and older, were overweight. Of these over 600 million were obese.

39% of adults aged 18 years and over were overweight in 2014, and 13% were obese. Most of the world's populations live in countries where overweight and obesity kills more people than underweight. [1]

General and abdominal obesity are the major subtypes of obesity. Compared with general obesity, abdominal obesity was considered to be more closely associated with chronic diabetes complications, such as cardiovascular diseases and diabetic retinopathy. [2, 3]

Knowledge of the current anthropometric status of a population is important to assess its evolution and the results of any interventions [4-6].

The objective of this study is to seek general and visceral obesity in the Algerian population and particularly that of the wilaya of Sidi Bel Abbes and this not only for treatment but also for prevention of such abnormality that can cause other serious metabolic disorders and this by assessing the anthropometric parameters namely body mass index and waist circumference.

2. Population and Methods

The province of Sidi Bel Abbes is a wilaya of Algeria in North Africa. It has **635 361** inhabitants in an area of **9 150.63** km^2. The population density of the Sidi Bel Abbes is **69.4** inhabitants per km^2. [7]

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Published online at http://journal.sapub.org/phr

Sidi Bel Abbes, Sfisef and Telagh are the biggest cities in Sidi Bel Abbès Province of the 52 towns that compose it.

772 subjects on **six towns** of the province were recruited for this study including **499 women** and **273 men (Figure 01)**

Our subjects were people in the general population aged between 18 and 93 years old, who come for general consultation. They were asked to participate in the study after explaining the purpose of the study.

Our cross sectional study lasted Ten months, from April to January 2015, at the level of the **Proximity Public Institutions of Health Public** of the six towns in **Sidi-Bel-Abbes** city.

2.1. Anthropometric Data

General obesity is defined by Body mass index and visceral obesity by waist circumference.

Body mass index (BMI) and waist circumference (WC) are two criteria that have been employed for classifying obesity. Associations of obesity classified by BMI, defined as general obesity, with chronic diseases and reduced life expectancy have been well documented [8].

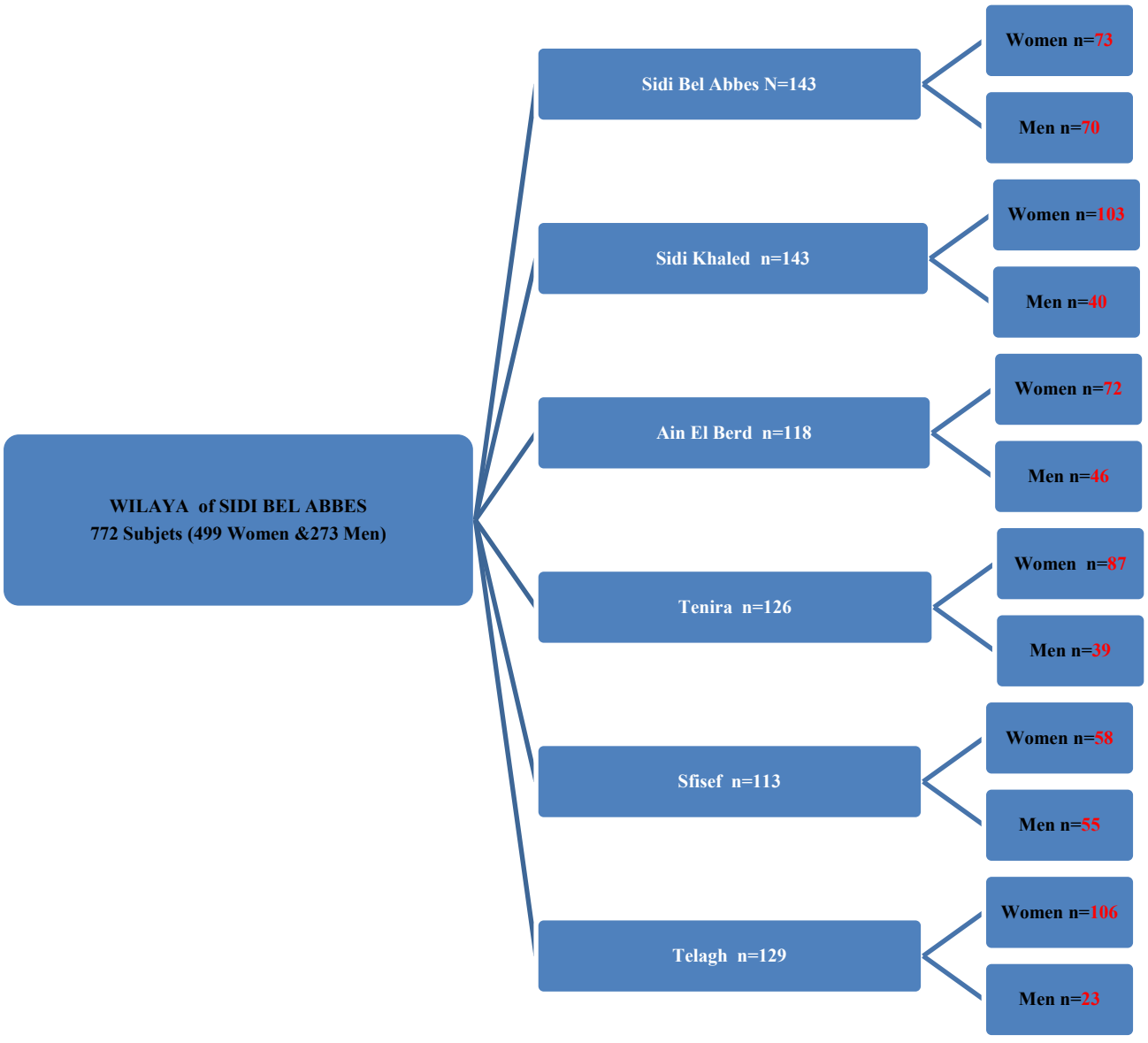

Figure 1. Distribution of the study Population in the six towns (n=772 Subjects)

Body Mass Index (BMI) is a simple index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in metres (kg/m^2). BMI= Weight (Kg)/height (m^2).

The classification of subjects by BMI was according the categories of world health organization international classification [9]

_ Underweight (<18.5)
_ Normalweight (18.5-24.99)
_ Overweight (25-29.99)
_ Obesity class I (moderate) (30-34.99)
_ Obesity class II (severe) (35-39.99)
_ Obesity class III (morbid) (≥40)

Abdominal obesity was defined according the definition of NCEP ATP III.

NCEP ATP III defined high waist circumference as (WC >88 cm for women and >102 cm for men) [10].

2.2. Statistical Analysis

All data are presented as means, standard deviation, median, percentiles, and percentages. Analyses were processed and performed through IBM SPSS version 22.0 [11].

Significant difference is defined as p value <0.05.

Furthermore, before starting the study protocol, we obtained a signed informed from all subjects, considering the ethical approval No. 299 dated 15 April 2014 from 'the Director of Health and Population of the *Wilaya* of Sidi-Bel-Abbes (Algeria).

3. Results

3.1. Age

The mean age in our population is **48.85±17.63** years old (**Table 1**). We notice a significant difference in age between women and men in the Wilaya of Sidi Bel Abbes.

Our results show a significative difference of age between the two genders only in the town of Ain el Berd (**Table 2**).

Table 1. Repartition of the study Population by age in the Wilaya of sidi Bel Abbes

	Minimum	Maximum	Median	Means ±SD
Wilaya of SIDI BEL ABBES				
TOTAL Population	18	93	49.00	48.85±17.63
Women	18	93	51.00	46.55 ^{S} ±16.94
Men	18	89	55.00	53.07^{S} ±18.13

Table 2. Repartition of the study Population by age in the six Towns of Sidi Bel Abbes city

	Minimum	Maximum	Median	Means ±SD
Town of SIDI BEL ABBES				
TOTAL POP	18	93	54.00	52.15±17.74
Women	18	93	51.00	50.56 ^{NS} ±17.91
Men	18	89	55.50	53.81 ^{NS} ±17.52
Town of SIDI KHALED				
TOTAL POP	18	86	38.00	41.86±16.38
Women	18	86	38.00	40.89 ^{NS} ±16.06
Men	23	86	40.50	44.35 ^{NS} ±17.14
Town of AIN EL BERD				
TOTAL POP	22	87	54.5	53.66±15.71
Women	22	79	49.5	49.79 ^{S} ±14.62
Men	26	87	62.00	59.73 ^{S}±15.39
Town of TENIRA				
TOTAL POP	20	82	38.00	42.02±16.09
Women	20	82	38.00	40.64 ^{NS} ±15.43
Men	25	82	40.00	45.28 ^{NS} ±14.85
Town of SFISEF				
TOTAL POP	25	88	59.00	57.50±16.67
Women	25	85	56.00	55.95 ^{NS} ±14.80
Men	25	88	64.00	59.15 ^{NS} ±18.45
Town of TELAGH				
TOTAL POP	18	85	45.00	47.58 ^{NS} ±17.43
Women	18	85	44.00	46.78 ^{NS} ± 17.45
Men	21	85	54.00	51.26 ^{NS} ± 17.24

Table 3. Anthropometric characteristics of the whole population

WILAYA OF SIDI BEL ABBES (n=772)				
	Min.	**Max.**	**Means ±SD**	**Median**
Weight (Kg)	40	120	71.61±14.10	70.00
Height (cm)	138	191	163±7.94	164
BMI (Kg/m²)	14.88	46.56	26.66±5.06	26.17

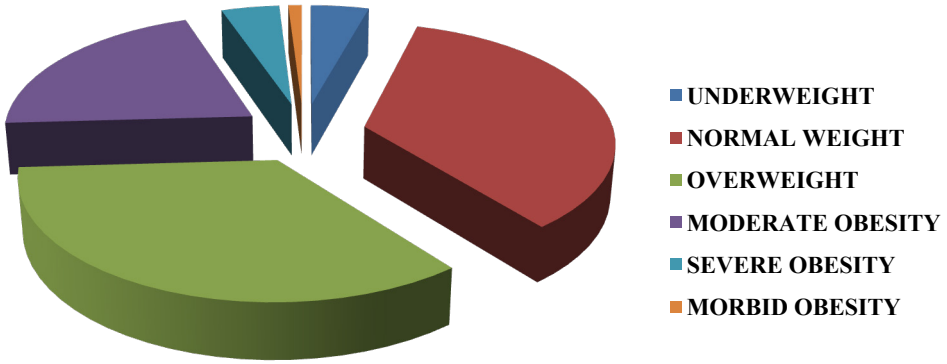

Figure 2. BMI of the population (n=772 Subjects)

Table 4. Anthropometric characteristics of the two gender of the population

WILAYA of SIDI BEL ABBES (n=772)								
	Women(n=499)				**Men (n=273)**			
	Min	Max	Moy ±Ds	Mediane	Min	Max	Moy ±Ds	Mediane
Weigh (kg)	40	114	69.75 ^{S}±13.78	68,20	41	120	75.01^{S}±14.06	74.00
Hight (cm)	138	182	161 ^{S}±6.59	162	145	191	168 ^{S}±8.07	169
BMI (kg/m²)	14.88	46.56	26.81±5.31	26.23	15.80	41.73	26.38±4.58	26.02

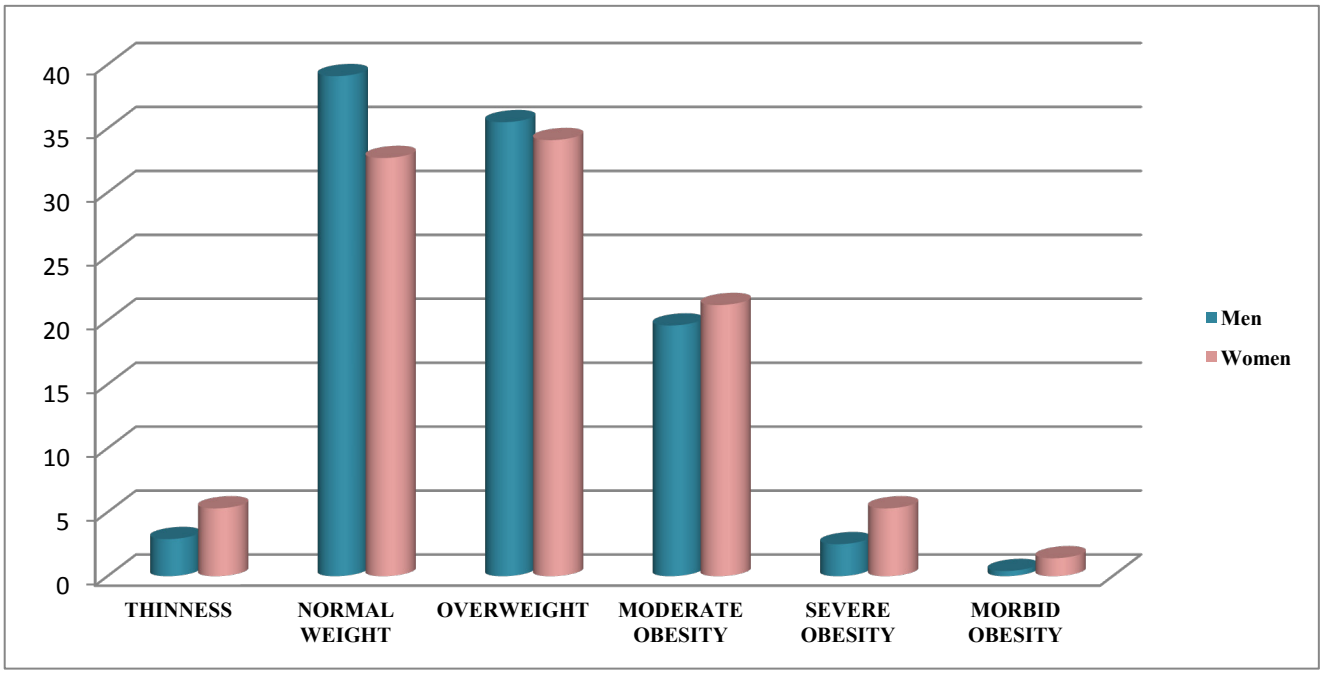

Figure 3. BMI of the two gender of the population

3.2. Anthropometric Parameters

3.2.1. General Obesity (BMI)

The anthropometric characteristics of the whole population of the Wilaya are presented in (**table 3**).

We note that the population is on state of **overweight (BMI>25). 60.70%** of the population have a BMI higher than **25** with **34.80%** are overweight and **25.90%** are obese (**Figure 2**).

Table 5. Overweight and Obesity in the six towns of Sidi Bel Abbes city

BMI ≥25					
SIDI BEL ABBES	**SIDI KHALED**	**AIN EL BERD**	**TENIRA**	**SFISEF**	**TELAGH**
48.95%	63.63%	66.10%	64.28%	62.83%	59.68%
BMI≥30					
SIDI BEL ABBES	**SIDI KHALED**	**AIN EL BERD**	**TENIRA**	**SFISEF**	**TELAGH**
20.27%	30.76%	33.89%	31.74%	21.23%	17.82%

Table 6. Anthropometric characteristic of the two gender in the six towns

Town of SIDI BEL ABBES						
	Women (n=73)			**Men (n=70)**		
	Min.	Max.	Moy ±Ds	Min.	Max.	Moy ±Ds
Weight	40	109	66.86^{NS}±12.20	41	103	71.56^{NS} ±14.19
Height	138	182	162.3^{NS} ±8.70	145	185	166.7^{NS} ±9.33
BMI	15.57	46.56	25.48^{NS} ±5.06	15.80	37.46	25.79^{NS} ±5.16
Town of SIDI KHALED						
	Women (n=106)			**Men (n=40)**		
	Min.	Max.	Moy ±Ds	Min.	Max.	Moy ±Ds
Weight	41	113.5	70.97^{NS}±16.13	52	110	78.77^{NS} ±14.39
Height	143	179	161^{S} ±7.48	151	182	169^{S} ±6.99
BMI	15.05	42.86	27.24^{NS} ±5.97	18.76	35.91	27.25^{NS} ±4.46
Town of AIN EL BERD						
	Women (n=72)			**Men (n=46)**		
	Min.	Max.	Moy ±Ds	Min.	Max.	Moy ±Ds
Weight	52	103	73.81^{NS}±13.09	55	120	78.20^{NS} ±14.63
Height	149	177	161^{S} ±5.~~53~~	160	191	169^{S} ±6.58
BMI	19.10	39.33	28.28^{NS} ±5.00	17.95	41.73	27.05^{NS} ±4.68
Town of TENIRA						
	Women (n=87)			**Men (n=39)**		
	Min.	Max.	Moy ±Ds	Min.	Max.	Moy ±Ds
Weight	41	99	68.72^{S} ±13.126	55	115	81.50^{S} ±15.73
Height	145	175	159.99^{S} ±5.81	152	186	172^{S} ±8.57
BMI	16.75	39.15	26.91^{NS} ±5.39	19.01	37.81	27.41^{NS} ±4.53
Town of SFISEF						
	Women (n=58)			**Men (n=55)**		
	Min.	Max.	Moy ±Ds	Min.	Max.	Moy ±Ds
Weight	47	103	72.59^{NS} ±12.99	48	100	71.09^{NS} ±10.25
Height	150	180	163^{S} ±5.21	154	182	166^{S} ±6.54
BMI	17.93	38.22	27.01^{NS} ±4.72	17.41	34.60	25.70^{NS} ±4.25
Town of TELAGH						
	Women (n=106)			**Men (n=23)**		
	Min.	Max.	Moy ±Ds	Min.	Max.	Moy ±Ds
Weight	39.6	97.2	67.19^{NS} ±12.90	55	95.5	70.98^{NS} ±10.35
Height	147	172	160.69^{S} ±5.64	149	182	167^{S} ±8.61
BMI	14.88	40.98	26.06^{NS} ±5.07	20.67	30.48	25.17^{NS} ±2.64

The results show also that **20.60%** present obesity class I (moderate), **4.30%** obesity class II (severe) and **1%** obesity class III (morbid).

Comparing between the two genders, our results show that Men have higher weight and height than women in the total population of the wilaya of Sidi Bel abbes whereas women have the higher BMI.

We notice a significant difference between the two genders in weight and height (**Table 4**).

The results show also that Women and Men of our population are **overweight** with **58%** of men present BMI higher than **25** Vs **62%** of women.

Moreover **27.9%** of women are obese (BMI>30) Vs **22.5%** of Men (**Figure 3**). The results show also that ideal weight is higher in men while obesity is higher in women (**39.11% Vs 32.66%**).

Table 7. Waist circumstance in the population of province of Sidi Bel Abbes

WILAYA SIDI BEL ABBES (n=772)				
	Min.	Max.	Moy ±Ds	Mediane
Waist Circumference (cm)	53	139	95.53±13.04	96.00

Table 8. WC of the two genders of the population

WILAYA OF SIDI BEL ABBES (n=772)								
	Women (n=499)				**Men (n=273)**			
	Min	Max	Moy ±Ds	Mediane	Min	Max	Moy ±Ds	Mediane
Waist Circumference (cm)	59	139	95,05±13,25	95	53	133	96,41±12,61	96,00

Table 9. Comparison of frequency of abdominal obesity between the two gender of population

	NCEP STANDARDS	**CHI_SQUARED VALUE (x^2)**	**P Value Significance**
Women	**74.54^{S}%**	118,69	**0,000**
Men	34,43%		

Table 10. Comparison of frequency of abdominal obesity between the two gender in the six towns of the city

Town of Sidi Bel Abbes			
	NCEP STANDARDS	**CHI_SQUARED VALUE (x^2)**	**P Value Significance**
Women	67.12%	21,27	0,000
Men	28.6%		
Town of sidi Khaled			
	NCEP STANDARDS	**CHI_SQUARED VALUE (x^2)**	**P Value Significance**
Women	66,01%	8,04	0,005
Men	40%		
Town of Ain El Berd			
	NCEP STANDARDS	**CHI_SQUARED VALUE (x^2)**	**P Value Significance**
Women	87.5%	37.74	0.000
Men	32.60%		
Town of Tenira			
	NCEP STANDARDS	**CHI_SQUARED VALUE (x^2)**	**P Value Significance**
Women	72.41%	17.18	0.000
Men	36.11%		
Town of Sfisef			
	NCEP STANDARDS	**CHI_SQUARED VALUE (x^2)**	**P Value Significance**
Women	93.10%	30.47	0.000
Men	45.45%		
Town of Telagh			
	NCEP STANDARDS	**CHI_SQUARED VALUE (x^2)**	**P Value Significance**
Women	70,75%	19,27	0,000
Men	21,73%		

Moreover, the study show that the town of Ain El Berd present the highest percentage with **66.10%** of the population have a **BMI≥ 25** and **33.89%** are obese (**BMI≥30**) (**Table 5**).

The study show also that the population of the six towns are overweight (**Table 6**); Highly significant difference were observed in the height between the two genders in the six towns.

Futhermore, we notice a highly signicant difference of body weight between women and men in the town of Tenira.

3.2.2. Abdominal Obesity (Waist Circumference)

The mean waist circumference is higher only in women according the standards of NCEP ATP III (**Table 8**).

The study show that over than **75%** of women have abdominal obesity. Moreover we notice also a highly significant difference (P<0.001) in the frequency of abdominal obesity between women and men (**Table 9**).

The results show also a higher significant difference in the frequency of abdominal obesity between women and men in the six towns of the city of Sidi Bel Abbes (**Table 10**).

4. Discussion

Obesity has become a major problem of health public in the whole world and in Algeria the situation is worrying. Our results show that the frequency and prevalence of general obesity and visceral obesity is high in our population.

Obesity, the first non-infectious disease in history, is itself a priority for discussion and support [12]. Globally, obesity is now the most common metabolic disease which is subject to significant and rapid increase. In 1995, there were 200 million obese and this number rose to 315 million seven years later. [13, 14]

Our population is in state of overweight with BMI = 26.66±5.06. 60.70% of the population have a BMI higher than 25; Moreover, the population of the six towns of the city of Sidi Bel Abbes is on state of overweight.

The increase prevalence of overweight in Algerian population was proof by many studies.

The study TAHINA ENS 2005, show that 55.90% of the Algerian population are overweight [15].

Our study show that the prevalence of overweight and obesity is higher in women than men with (62% women are overweight Vs 58% men) and 27,9% of women are obese (BMI>30) Vs 22,5% of Men.

This results are close to that of the study TAHINA ENS 2005, with (66.52% Women Vs 41.90% Men) are overweight and (28.39% Women Vs 8.69% Men) [15].

Another descriptive cross-sectional study of a representative sample of the population of the health sector in Ain Taya (Blida) which 1511 individuals shows that 25.9% of the population is obese (32.8% women Vs 12.2% men) [16].

The study show a highly significant difference (P<0.001) in the frequency of abdominal obesity between women and men (**Table 9**). Over than 75% of women have abdominal obesity **Vs 34.43%** men. This difference was notice in the six towns of the city.

The same studies show also a highly difference in the prevalence of abdominal obesity between the two gender; TAHINA ENS 2005 with 75.02% women Vs 35.43% men [15], and the study of chibane and al with 68,8 women Vs 23,2% men [16].

5. Conclusions

Our study show that the prevalence of overweight, obesity and abdominal obesity is high in the northern of Algeria and the difference between the two genders is very significant.

We have to estimate and assess obesity in the Algerian population in order to stop it and prevent it because it can cause more serious problems.

Abbreviation

NCEP ATP III: National Cholesterol Program Adult Treatment Panel III

WC: Waist Circumference

SD: Standard Deviation

S: Significantly different at p<0,05

NS: Not Significantly different

ACKNOWLEDGEMENTS

A big thank to the director and all the staff of Health and Population of the wilaya of Sidi Bel Abbes and also the directors and staff of **Public Institutions of Health Public** of the six towns in **Sidi-Bel-Abbes** city.

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