The Epidemiological Shape Of Influenza In Tunisia: Season 2014-2015

Zorraga.M[1], Ben Salah A[2] , Dellagi.R[3], Lejmi.O[4], Abdedaim N[5], Ayada.A[6], Gallalou.J[7], Sakli.M[8], Ounan.H[9], Mamlouk H[10], Maazaoui L[11], Ben Hadj Kacem MA[12], Slim.A[13]

I- Introduction and aim:

Influenza is an acute viral infection transmitted by air. It`s a highly contagious disease that can cause serious complications, especially among vulnerable people, it presents a major public health issue with a considerable socio-economic impact.

The purpose of this work is:

- To review the clinical and epidemiological impact of influenza in Tunisia for the 2014/2015 season.
- To characterize the influenza strains circulating in Tunisia community .
- Make recommendations to overcome challenges.

II- Materials and Methods:

This retrospective study is based on data from National surveillance unit of influenza; it relies on descriptive analysis of influenza surveillance data provided by the network of sentinel sites and national influenza centre (NIC).

III-Results and discussion:

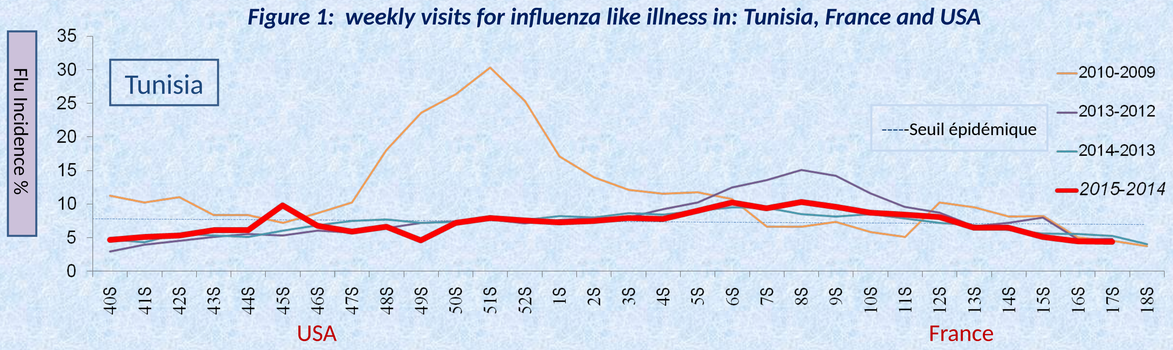
The Seasonal flu outbreak occurs between October and April in the northern hemisphere and between April and October in the southern hemisphere. In Tunisia ,epidemiological and virological surveillance of influenza began in week 40/2013(1 October 2013) and ended in week 18/2014 (30 April 2014). During the study period : 103.731 cases of ILI (Influenza-like illness) were collected from a total of 1.423.294 patients seen at sentinel sites, representing 7.3% of total patients.

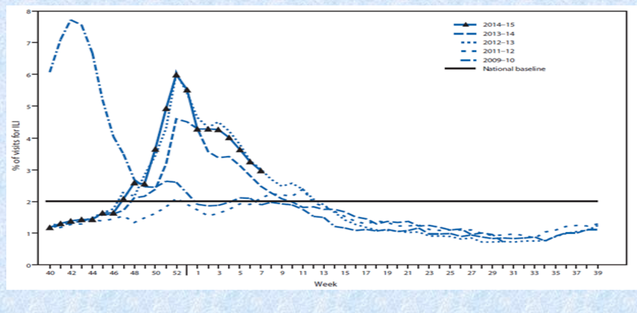
Influenza occurs globally with an annual attack rate estimated at 3.3% to 10% in Belgium and 1.6% to 6% in the USA[1;3].

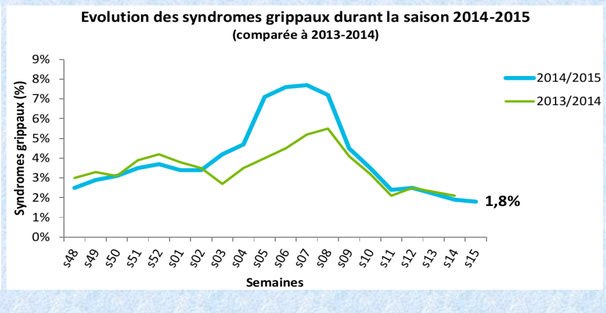
❑Supervision in the community:

The flu epidemic for the winter season 2014/2015 lasted 12 weeks from 12 January 2015 (2015 /w3) to 12 April 2015 (2015/w15), it was more longer than the previous season(in Belgium has lasted 10 weeks [3]). The epidemic peak was observed during the week of 4 to 10 February 2015 (2015 / w6), with a national peak week rate of 9.5% (Figure 1)

Figure 1: weekly visits for influenza like illness in: Tunisia, France and USA



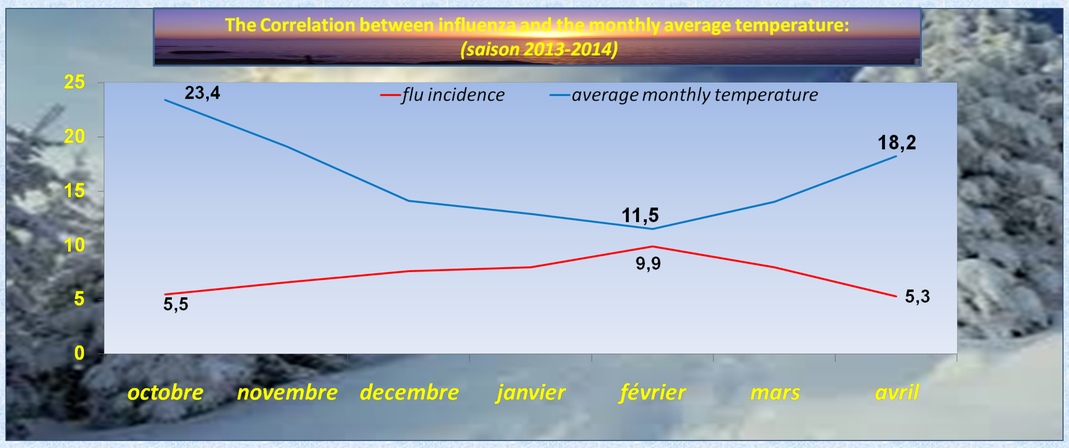




Influenza epidemic of 2014-2015 season was more severe than the previous season and started later than that of the previous year. These findings were also observed in France , in Belgium and in the USA [2;3].

❑ The Correlation between influenza and monthly average temperature:

Epidemiological surveillance of influenza on Tunisia territory has shown that the epidemic peak was recorded during the coldest weeks (w6), in fact there is an inverse trend of monthly average temperature and influenza incidence, this remarkable correlation shows that the rate of influenza incidence increased as the temperatures gradually decline. The hypothesis that the virus is favored by low temperatures and inhibited by higher temperatures is confirmed in our study.



❑Geographical distribution of influenza:

The geographical distribution of influenza activity shows that the highest flu rate was recorded in Kef : 15.2 % , Mannouba : 14.9%, Siliana :12.6% , Gafsa: 12.1%, Monastir : 11.2% and in Kasserine: 10.8%.

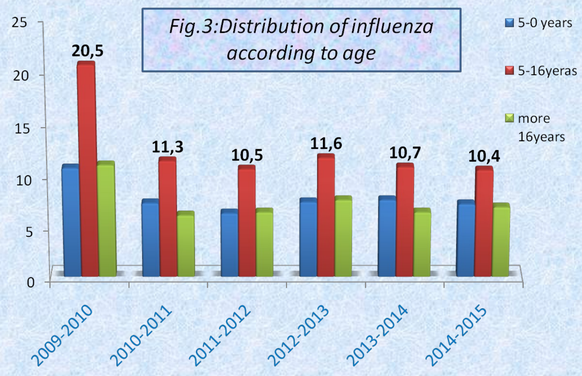
All the governorates (24) have been affected by the flu but the incidence rate was significantly higher in regions that are the most populated.

❑Distribution of influenza according to age:

Children aged 5 to 16 years are the most affected by the flu in Tunisia, this may mean that young people have lower immunity and are more exposed to the virus in the confined areas(schools ..).

It was also observed that the more older (>16 years) are the least affected, this can be explained by passive immunization (vaccination against influenza that targets the elderly patients) and active immunization (exposure to various Virus strains during their life).

Fig.3:Distribution of influenza according to age



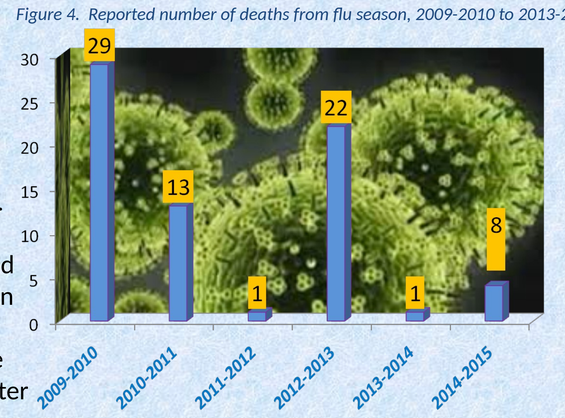
❑ Influenza Hospitalization Surveillance and severe influenza illness :

Among the consultants for ILI(influenza like illness), 386 severe cases (0.3%) were hospitalized, significantly higher rate than the previous season (0.18%) and lower than what is observed in France (7%) [3]. These severe cases were mainly infected with A (H1N1) virus.

From this indicator, it can be considered that influenza disease is still a major public health problem with a large number of severe forms. On the other hand we notify that Tunisian SARI (severe acute respiratory infections) surveillance system is insufficient, because of the lack of hospital physicians adherence to reporting SARI cases and the reduced number of designated centers for SARI. Hence the need to establish an exhaustive monitoring system for SARI to assess the severity and the impact of the flu epidemic in the population and to better understand the risk factors of severe forms of influenza.

❑Surveillance of global mortality:

Figure 4. Reported number of deaths from flu season, 2009-2010 to 2013-2014



The number of annual deaths attributable to influenza in last 5 years varies from 1 to 29 deaths according to DSSB findings, in 2014-2015 season ,it was 8 death: 75% were adults and 25% have more than 65 years.

In France this number is 232 deaths for the 2014-2015 flu season [3]. In Canada is 511 deaths (2014-2015) [5].

One explanation of This, is the demographic aging of French population (The proportion of seniors aged 65 and over in 2014 is de16.5%). But in in Tunisia (the proportion Of seniors aged 65 and over in 2014 is 7.5%).

On the other hand it seems necessary now to define the mortality threshold alert caused by flu in Tunisia to better assess the severity of influenza in the population.

We also note that, for 16 years, the flu epidemic threshold was not reviewed in Tunisia, so it's time to revise it to be adapted to epidemiological transition in our country.

❑Virological surveillance

Virological surveillance is ensured by the National Influenza Centre (Charles Nicolle Hospital), by analyzing of samples taken from sentinel sites. The laboratory use RT-PCR technique to subtype strains of influenza virus .

During the 2014-2015 season: 1034 samples were collected with a positivity rate of 27.7%.

The virus A (H3N2), A (H1N1) and type B circulated during the flu season, with a dominance of virus type A.

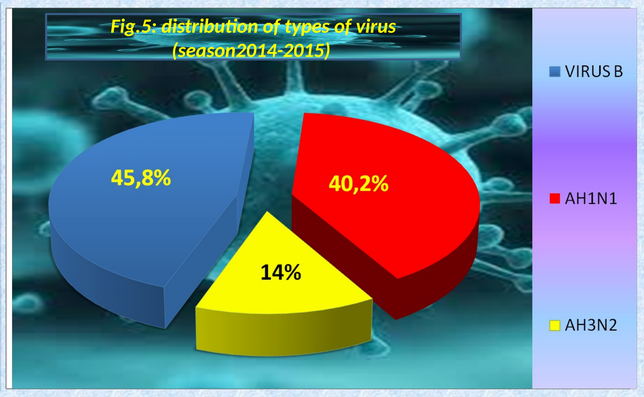
The seasonal distribution of 3 types of virus was: Virus A (H3N2) (14%); A(H1N1) pdm2009(40.2%); B virus (45.8%).

In the course of the 2012-2013 season: 924 samples were collected with a positivity rate of 37.4%.

The seasonal distribution of 3 types of virus in that season was: Virus A (H1N1)pdm2009 (50.1%), Virus B (38.3%), Virus A (H3N2) (6.1%).The knowledge of influenza virus strains in circulation ensures the adequacy of the vaccine composition, assessed annually and participates in the search for the emergence of a new influenza virus with pandemic potential .

Virus/country (2014/2015)	Tunisia	France	*Switzerland*
positivity rate for influenza viruses	27.7%	55%	52%
(Number of samples tested)	1034	1555	937
B total	45.8%	15%	29%
A(H3N2)	14%	**17%**	**56%**
A(H1N1)pdm09	**40.2%**	13%	14%
A unsubtyped	00%	54%	01%

Fig.5: distribution of types of virus (season2014-2015)



We notice that the sampling positivity rate (27.7%) is low compared to that of Switzerland (52%) and France (55 %) ,this can be explained by the quality of nasopharyngeal specimens. Moreover, the distribution of influenza viruses for the 2014-2015 season is not closed to that of Switzerland and France, with a predominance of influenza A (H1N1)pdm09 [4].

❑ Vaccination Status:

The studies estimated that ideal vaccine should have an efficiency of 90%. During the 2014-2015 season, the vaccine against the flu is not as effective as other years and it varies from country to country : in UK vaccine effectiveness in preventing laboratory confirmed influenza was estimated to be 3% overall [6]. This compares to approximately 50% vaccine effectiveness that has typically been seen in the UK over recent years. In the USA (for 2014-2015 season), vaccine effectiveness against influenza A(H3N2) viruses was 18% and against influenza B viruses was 45% [7]. These low estimates may reflect the high proportion of antigenically characterised A(H3N2) viruses which have drifted away from the vaccine strain. Another factor influencing influenza vaccine effectiveness is the age and health of the person being vaccinated. In general, the flu vaccine works best in young, healthy people and is less effective in people 65 years of age and older [8].

In Tunisia, no recent national study has been done to assess the efficiency of the vaccine. As well, for the season 2014-2015 the Directorate of Basic Health care (DSSB) has provided 270.000 doses of influenza vaccine . flu vaccine uptake rate for the people aged 65 years and over is only 33%, in UK the rate is 73%.

In Spite of the implementation of a sentinel influenza surveillance since 1999, Sentinel centers were in continuous operation only in some districts , irregular reporting of ILI & SARI cases by the majority of districts with an average of 58% of data completeness . The absence of an information management system, the dispersion of data between the National Program of Influenza and the National Influenza centre (NIC) and the lack of multi-sectoral collaboration, prompted us to launch a strengthening project to overcome these challenges and create an appropriate surveillance system, efficient and consistent with international standards.

IV- RECOMMENDATIONS :

❑Establish a management system of quality according to the standard in order to ensure users a data source fully compliant with coherent work methods, validated and searchable. This system is oriented towards continuous improvement and prevention of non-conformities.

❑ **C**reate a national electronic system for collection of information (IMS), which allows the analysis and redistribution on real-time of epidemiological data from the activity of the sentinel sites. This IT system should be flexible, and ready to adapt to changes in the epidemiological situation.

❑Strengthen capacity of the epidemiologists in the surveillance and responding to outbreaks

❑Review national epidemic threshold of flu, it will perhaps be interesting to work on different epidemic thresholds to determine the most appropriate.

❑Define the national alert threshold of mortality imputable to flu to assess the severity of the epidemic in the population .

❑Strengthen the capacity of biological analysis by adding other virology laboratories in the system

V-CONCLUSION :

The influenza epidemics 2014-2015 was particularly long, marked by the co-circulation of three influenza viruses, the impact of the epidemic in terms of ILI consultations and hospitalizations was more severe than 2013-2014 season.

Viruses know no borders, control and fight against the influenza requires a global vision of the dynamics of the disease in our country, as well as around the Mediterranean in the context of better contain any unusual events.

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