The Epidemiological shape of Influenza in Tunisia : Season 2015-2016

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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 purposes of this work are to:

- Review the epidemiological situation of influenza in Tunisia in The 2015-2016 season;
- Determine if the A (H1N1) virus has a particular virulence in Tunisia during the 2015-2016 season;
- Make recommendations to overcome challenges.

II- MATERIALS AND METHODS:

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

III-RESULTS AND DISCUSSION:

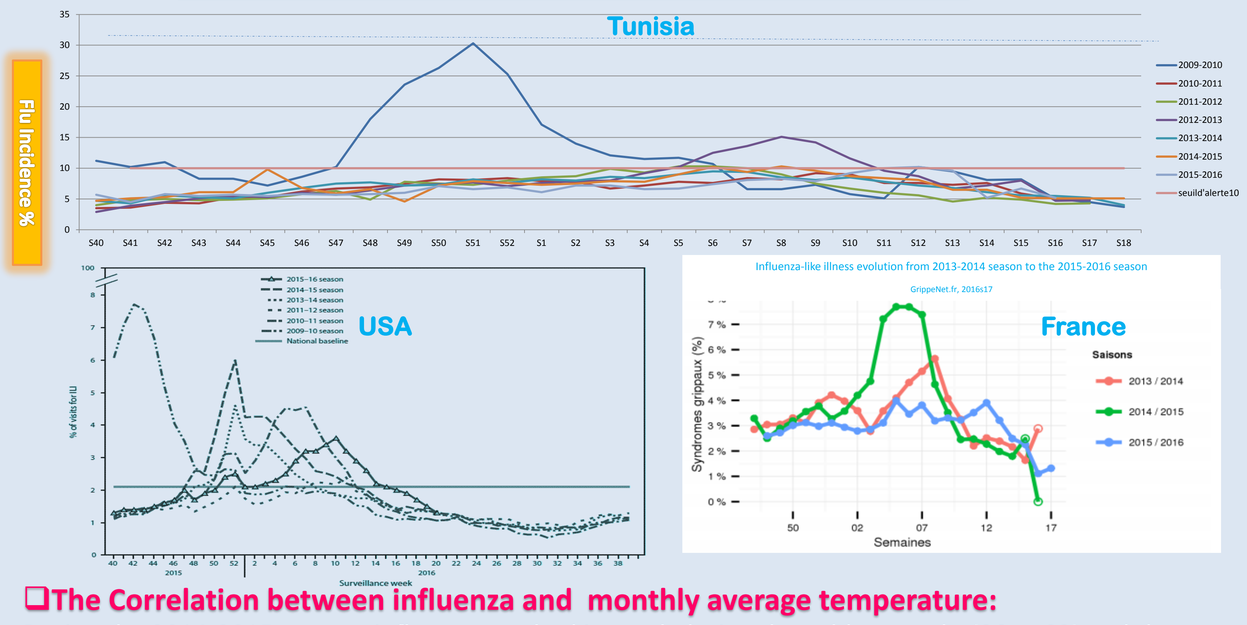
Influenza surveillance in Tunisia has been in established since 1999 with the creation of network sentinel sites, but it significantly developed on March 2014, by the enhancement of the national influenza surveillance system. In Tunisia, clinical, epidemiological and virological surveillance of influenza began in week 40/2015 (1st of October 2015) and ended in week 18/2016 (30th of April 2016), since the Seasonal flu outbreak occurs between October and April in the northern hemisphere and between April and October in the southern hemisphere. During the study period : 96,240 cases of ILI (Influenza-like illness) were collected from a total of 1,394,782 patients seen at sentinel ILI sites, representing 6.9% of total patients versus 7.7% during the 2014-2015 season.

Influenza occurs globally with an annual attack rate estimated at 3.3% to 10% in Belgium and 1.6% to 6% in the USA [1,2].

❑Supervision in the community:

The epidemiological surveillance of influenza on the Tunisian territory showed that the influenza epidemic was spreading in the winter season 2015/2016 during fourteen weeks from the 25th of January 2016 (2016 / W4) to the 29th of April 2016 (2016/ W18) with an incidence rate of 10.3% (Figure 1). It started a little later than it did during the previous season and lasted relatively longer (14 weeks versus 8 weeks). These findings were also observed in Europe [3,4] and in USA [5].

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



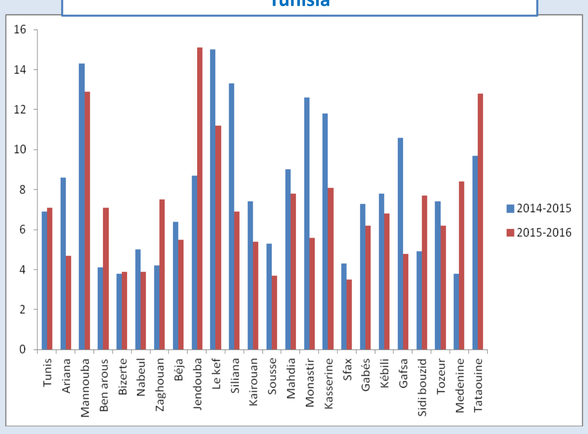
❑The Correlation between influenza and monthly average temperature:

During the 2014-2015 season, influenza reached its peak during the coldest weeks (S6 to S9) and there was an inverse trend of the monthly average temperature. This correlation has not been observed during this season having regard to the shift of the cold season. In fact, this flu season peaked during the week of 14 to 20 March 2016 (2016/S12), later than usual. All these findings were also observed in Europe [3] and in USA [5].

❑Geographical distribution of influenza:

The geographical distribution of influenza activity shows that the highest flu rate was recorded in Jendouba (15.1%) followed by Tataouine (12.8%) while the lowest was noticed in Sfax (3.5%). All of the 24 governorates of Tunisia have been affected by the influenza and the incidence is higher in the most populated regions.

Figure 2: Geographical distribution of influenza in Tunisia



❑Distribution of influenza according to age:

Children 5 to 16 years old are the most affected by the flu in Tunisia, this may be explained by the fact that young people have lower immunity and are more exposed to the virus Within the confined areas (schools, .)(figure 3).

Figure 3 : Distribution of ILI cases according to age in Tunisia from flu season 2009-2010 to season 2015-2016

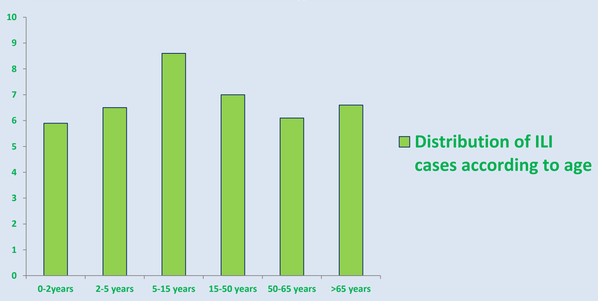
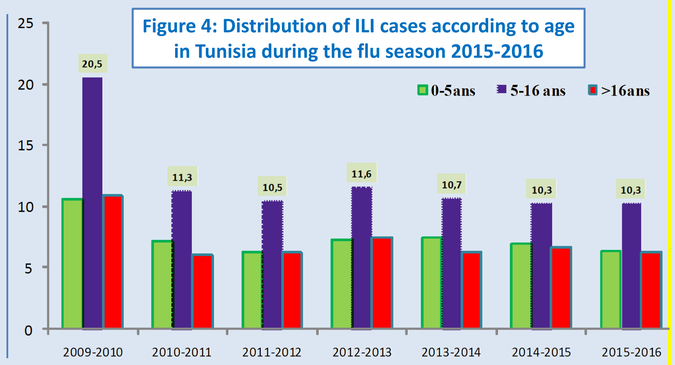


Figure 4: Distribution of ILI cases according to age in Tunisia during the flu season 2015-2016



❑ Influenza Hospitalization Surveillance and Severe Influenza illness:

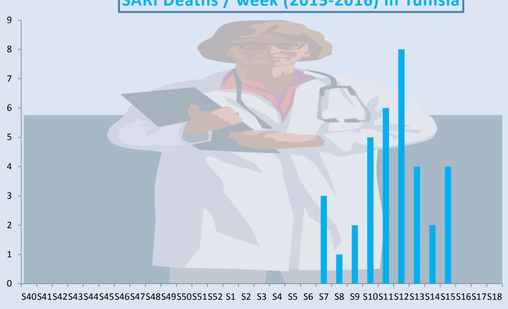
Among the visits for Influenza-Like Illness (ILI), 190 severe cases were hospitalized representing a lower proportion than that is observed in France (0.19 vs 0.3%) [3] but a comparable proportion to the previous season (0.19% vs 0.2%) and were mainly infected with A (H1N1) pmd09 virus (57% of cases vs 74.5% in the USA [5] .

The average age for these severe cases was 46.5 years, with extreme ages varying between 6 months and 73 years while in England ,the mean age was 42.6 years with a range of four years to 65 years old [4] . Subsequently influenza disease remains still a major public health problem with a large number of severe forms, but, we notify that Tunisian SARI (severe acute respiratory infections) surveillance system remains insufficient, because of the lack of the adherence of hospital physicians to reporting SARI cases and the limited number of designated centers for SARI at only 6 centers . Hence, the establishment of an exhaustive SARI monitoring system is compulsory 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:

The lethality of the severe cases was significantly higher than that observed during the previous season (20% vs 3%) and was H1N1 associated in 73.7% of cases. During Week 12, there was an increased circulation of influenza viruses in Tunisia and subsequently there were the highest number of deaths (10 deaths representing 26.3% of the 38 influenza deaths). In the USA as well, The percentage of deaths attributed to Pneumonia and Influenza peaked during the week 11 ending March 19, 2016 at 7.9% [5] and in Engalnd 14% [4]. In canada, 270 deaths attributed to flu were reported [6].

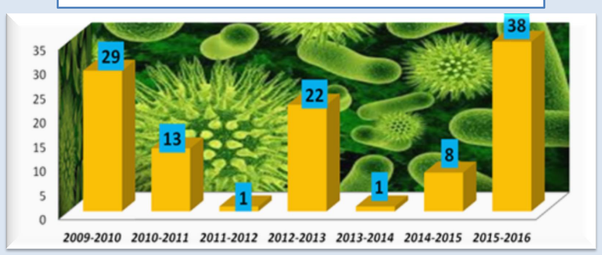
Figure 5: Distribution of SARI deaths/week



In Tunisia, as in the most of other countries [3,4,5], the virus convicted in the majority of ILI cases and SARI deaths was influenza A (H1N1): 57.4%

Although the most affected age group by SARI is that of 50 to 65 years, more than half of SARI cases (58%) have no risk factors, and 37.1% of SARI deaths had no risk factors also.

Figure 6: : Evolution of the reported deaths from the 2009-2010 flu season to 2015-2016 season



The regions where the most deaths were recorded are: Gafsa, Ariana, Sousse and Tunis.

Note that it seems necessary now to define the mortality threshold alert caused by flu in Tunisia to better assess the severity of influenza. We note that, , the flu epidemic threshold haven't not been reviewed in Tunisia for 16 years, so it's time to revise it in order to be adapted to the epidemiological transition.

❑Virological surveillance

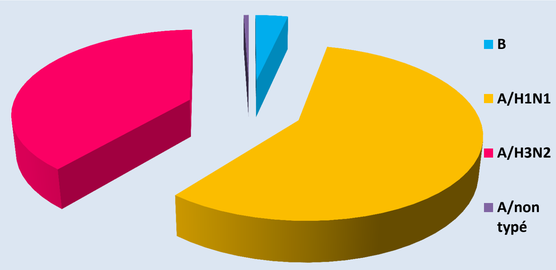
Virological surveillance is ensured by the National Influenza Centre (Charles Nicolle Hospital), by analyzing samples taken from sentinel sites. The laboratory uses RT-PCR technique to subtype strains of influenza virus. During the 2015-2016 season: 1518 samples were collected (vs only 700 in the last season) with a positivity rate of 24.4% vs 25.6 % during the previous season, which is relatively higher than that recorded in USA: 10.2% [5].

The virus A (H3N2), A (H1N1) and type B circulated during the flu season, with a dominance of virus type A. Indeed, the seasonal distribution -of the positive specimen- of flu virus was: Virus A (H3N2) : 38.5% vs 23% during last season); A(H1N1) pdm2009: 57.4 % vs 12.8%; A (non subtyped): 1% vs 0% and B virus: 3.5% vs 64.2%). The knowledge of influenza virus strains in circulation is so important since it 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/Season	2012-2013	2013-2014	2014-2015	2015-2016
Positive Influenza samples proportion (%)	35.5	12.6	27.7	24.44
Tested samples number	924	514	1034	1518
VIRUS B	132 (40.2%)	1 (1.6%)	131 (45.8%)	13 (3.5%)
A(H3N2)	21 (6.4%)	60 (96.8%)	40 (14%)	143 (38.5%)
A(H1N1)pdm09	175 (53.2%)	1 (1.6%)	115 (40.2 %)	213 (57.4%)

Tab.1: Evolution of influenza viruses distribution from 2013 until 2016

Figure 7 : The influenza Virus Season distribution during 2015-2016 season, in Tunisia



The co-circulation of the three influenza viruses began in late January (W4) with a gradual increase in the circulation of the type A (H1N1) pmd09 virus. During the week W12, the type A (H1N1) pmd09 virus was more common than the type B whereas in England the virus B, started to increase in week 09 of 2016, co-circulating with influenza A(H1N1)pdm09, and peaking at 15.5% in week 12 [4].

❑Vaccination Status:

The studies estimated that ideal vaccine should have an efficiency of 90%. During the 2015-2016 season, the vaccine against the flu is not as effective as other years and it varies from country to country : in USA vaccine effectiveness in preventing laboratory confirmed influenza was relatively high 47% overall [7], as it is typically seen in the UK over recent years, approximately 50%. The age and health of the vaccinated person is one of the factors influencing influenza vaccine effectiveness. 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. Moreover, for the season 2015-2016, as for the last season, the Directorate of Basic Health Care has provided 270, 000 doses of influenza vaccine .

In Spite of the implementation of a sentinel influenza surveillance since 1999 collected data remains incomplete, even though the monitoring fields was expanded by the Epitech tool monitoring system and the monitoring based on events (EBS).

IV-RECOMMENDATIONS:

During the 2015-2016 season, there was a good coordination thanks to the regional focal points, with a regular weekly reports to the PHC directorate, and since the kick off of the influenza surveillance in Tunisia, and for the first time, an Epidemiological Bulletin was monthly edited and a seasonal influenza surveillance guide was elaborated. But, we should:

- ➢Strengthen capacity of the epidemiologists in the surveillance and responding to outbreaks;
- ➢Review national epidemic threshold of flu;
- ➢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;
- ➢Elaborate a communication strategy;
- ➢ Improve network monitoring to emergency services and intensive care in major hospitals through computerization;
- ➢Involve more hygiene services either in hospitals or in community medicine , in the data collection and ensure its transmission to the monitoring network;
- ➢Extend the vaccination program to pregnant women systematically.

V- CONCLUSION:

- ➢ The 2015-2016 influenza epidemic started little later than the previous season,
- ➢marked by the co-circulation of three influenza viruses and the predominance of the virulent type A (H1N1) pmd09 virus, the impact of the epidemic in terms of ILI consultations and hospitalizations was comparable to the previous season, but the lethality of severe cases was significantly higher.
- ➢Viruses know no borders, control and fight against the influenza require a global vision of the dynamics of the disease in our country, as well as around the Mediterranean in order to better contain any unusual event.

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