

Research Article

Support for Tetanus in Decentralized Area of Senegal

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Abstract

Introduction: Tetanus remains a persistent bacterial endemic in Senegal, the Objective of our study was conducted to describe the epidemiological, clinical, therapeutic, evolutionary and associated factors of tetanus in the Thiès region (Senegal).

Material and Methods: The multicentric, retrospective, descriptive and analytical Study was conducted in three large public hospitals in the Thiès region using tetanus hospital records from 2013 to 2017.

Results: The total 86 patients were registered representing hospital prevalence. The age average was 27.7 ± 21.9 and the sex ratio was 8.5. The transmission was predominantly integumentary (66.3%). Almost all patients (95.3%) had a generalized form of tetanus with 36% severe case (Stage III of Mollaret) of patients. An infectious complication (57%) was noted in 84.8% of cases. The fatality rate was reported as 41% with factors associated with the occurrence of death, advanced age, the existence of complications and the absence of intubation of severe tetanus.

Conclusion: Study confirmed that tetanus is a public health problem in the Thiès region with a high morbidity and lethality.

Keywords: Tetanus; Lethality; Thiès region; Senegal

Introduction

Tetanus, a *Clostridium tetani* toxigenic infection, remains a persistent bacterial endemic, despite the Expanded Program on Immunization launched in 1979 in Senegal [1]. A serious infection (due to the occurrence of complications) can be life threatening. In developed countries, the incidence of tetanus has become very low because of a good vaccination policy that incorporates vaccination recalls, improved hygiene conditions and correct timely treatment of wounds [2].

Antithesis, in countries with limited medical facility, tetanus remains a priority health problem in terms of both morbidity and mortality. Despite progress made the immunization coverage in Senegal still low. Immunizations reminders remain expensive and unavailable to the population, especially in rural areas. It should also be emphasized that people in rural areas are not sufficiently informed about the risks of incomplete vaccination.

So the annual incidence of tetanus relative to other age groups in the population remains high, estimated to 11.8% [1,3].

Many research projects carried out at the service of infectious diseases at the Fann hospital, tetanus treatment referral center, at Dakar, the capital of Senegal [3-5] point out that the endemic situation of tetanus in the other regions of Senegal remains unknown now.

It is in this context that we conducted this study to describe the epidemiological, clinical, evolutionary profile of tetanus in the Thiès region.

Materials and Methods

The study is a descriptive and analytical retrospective and it was

conducted from 1st January 2013 to 31th December, 2017, for duration of five years.

It collected all cases of tetanus hospitalized in the 3 large public hospitals located in the 3 departments of the Thiès region (Thiès Regional Hospital, Mbour Public Hospital and Tivaouane Hospital). Only the Thiès Regional Hospital has an intensive care unit.

The diagnosis of tetanus being purely clinical, it was held in front of the following arguments:

Presence of a gateway, lack of vaccination or incomplete immunization, also a presence of a clear state of consciousness, a trismus associated or not with dysphagia, contracture and / or paroxysms spontaneous or provoked on clinical examination.

Data was collected from patient records on a standard survey form for each patient included. It included the following variables:

Sociodemographic

Age, sex, geographical origin, occupation of patients and name of health care facility. We have defined three areas: urban including municipalities and their agglomerations. Rural located outside major urban centers or campaigns and suburban or suburbs surrounding the city.

Clinical

Medical, surgical and vaccine history, incubation and invasion duration, clinical constants, nature of the entrance, presence of a trismus, dysphagia, contractures and paroxysms.

Prognosis

Dakar score [6] and Mollaret stadium [7].

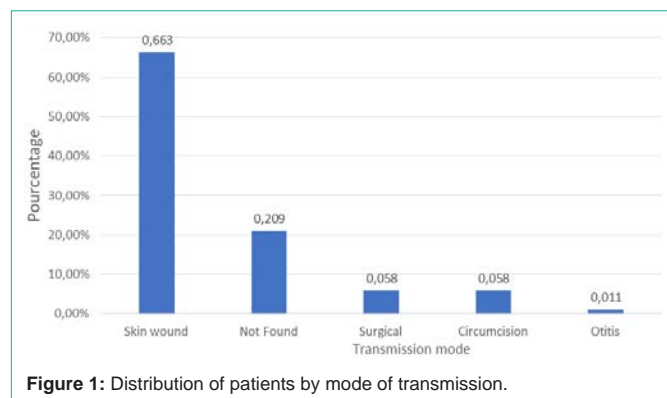


Figure 1: Distribution of patients by mode of transmission.

Therapeutic

Sensory isolation, use of sedatives, antibiotics, treatment of the entrance, immunization, intensive care, nutritional rehabilitation and continuation of the vaccination at the exit.

Evolutives

Healing with or without sequelae, death, sequelae, and exit without medical advice.

The capture and exploitation of data were carried out using the Epi-info software version 3.5.4 of July 30, 2012 CDC / ATLANTA.

The comparison of qualitative variables was carried out using the Chi square test, quantitative ones by the ANOVA test or para metric tests according to the conditions of validity. A value of $p \leq 0.05$ was chosen as the significant threshold.

Ethically, we obtained the agreement of the patients who were cured, the different service chiefs and the directors of the hospitals before to use data for research and publication. The anonymity of the patients was respected by using the file number.

Results

During our study period, we recorded 86 patients admitted for tetanus, with average hospital prevalence at the three sites (0.4%). There is a male predominance with a sex ratio (M / F) of 8.5.

The average age of the patients was 27.7 ± 21.9 years [1-86 years] and the predominant age group was between 11 and 21 years (25 patients). There was no case of neonatal Tetanus (TNN) during our study period. Our study population consisted mainly of students (46.5%) and informal sector workers (16%) with a predominance of drivers and guards.

Patients were single in 59.3% of cases. Almost half of the patients came from the urban area in 48% of the cases, followed by the rural area in 39% of the cases and the suburban area in 13% of the cases. They were admitted at the regional hospital of Thiès in 64% of cases, followed by the hospital of Mbour (25%) and the hospital of Tivaouane (11%). Spontaneous consultations in the different structures accounted for 51.2%. In about one third of cases (32.6%), there was a transfer of patients, 20 came from health posts, 7 from health centers. We noted 16% of mutations (transfer of a patient between the services of a hospital). Five (5) patients had a history of high blood pressure, recent surgery (tibial fracture, umbilical hernia repair), mandibular malignancy and chronic leg ulcer.

Immunization status for tetanus was incomplete in 54.7% of cases, not specified in 45.3% of cases.

The integumentary entry portal predominated with 66.3%, followed by surgical and post circumcision with 5.8% each. In 20.9% of cases, the entry portal was not found (Figure 1).

Clinically, three quarters of patients had an incubation period of less than 7 days. The invasion period was greater than 48 hours in 51% of patients. Almost all (95.3%) of patients had a generalized form of tetanus.

The score of Dakar was 2 to 3 for 32 patients equal to 49%. According to the Mollaret Stage classification, 40% of the patients were in stage II, followed by 36% who were in stage III.

The evolution is marked by the occurrence of complications in 83 patients. Infectious complications predominated (31 cases) followed by cardiovascular (15 cases), metabolic and nutritional (15 cases), respiratory (10 cases) and mechanical complications.

Therapeutics of Tetanus

All our patients were under sedative treatment with diazepam and a muscle relaxant. It was associated with magnesium sulfate for 2 patients.

The patients were isolated in a room away from light and noise. Only serious tetanus patients had been treated in the intensive care unit at the Thiès regional hospital (9% were under mechanical ventilation by orotracheal intubation). Forty-five (45%) of patients had received care at the door such as disinfection and simple bandage in each or 5% cases.

Eighty-three (83) patients, 97%, had received equine heterologous Anti-Tetanus Serum (ATS). It was administered intramuscularly in 68% of cases, sub-occipital in 24% of cases and subcutaneous in 8% of cases.

Seventeen patients received a dose of 250 IU sub occipital and the other doses ranged from 500 IU to 6000 IU either subcutaneously or intramuscularly.

The patients were on antibiotic therapy. Metronidazole was used in 48%, followed by penicillin G and metronidazole with 28%. Preventive tetanus vaccination was started in 76 patients, equal to 89%.

Out of 86 patients admitted for tetanus during our study period, 35 patients died a lethality of 41%.

Epidemiological, clinical features, Therapeutic and evolutionary characteristics are summarized in Table 1.

Factors associated with death

Patient age has a statistically significant effect ($p=0.01$) on the occurrence of death. The higher the age, the higher the lethality. The number of deaths was greater in patients who had experienced complications statistically significantly ($p=0.000$). Lethality was nil in severe tetanus intubated statistically significantly ($p=0.000$).

Discussion

Tetanus is a reportable disease. Apart from studies carried

Table 1: Comparative table between different sites of care.

Site of PEC	HRT	Mbour	Tivaouane	P	
Number of patients	43	28	15		
Prévalence	0.31	0.93	0.32		
Average age (years)	29.48±21.97	22.39±20.64	32.87±23.51	0.187	
Median (years)	22	14	35		
Extreme (years)	[2-86]	[1-70]	[2-70]		
Sex ratio(H/F)	9.75	6	14	0.695	
Type of PE	Integumentary	25	21	10	0.7294
	Surgical	6	3	1	
	Other	10	4	4	
Stadiums of Mollaret	I	6	12	3	0.062
	II	19	10	5	
	III	18	6	7	
SAT	Sub occipital		0	20	10 ⁻⁶
	S/c ou IM	31	28	4	
VAT		37	26	13	0.7606
Assisted ventilation		8	NA	NA	NA
ATB Use	Metronidazole	27	9	5	0.003
	Metronidazole + penicilline G	9	13	2	
	Penicilline G	1	2	5	
	Other	6	3	3	
Evolutionary modalities	Living	27	19	5	0.2713
	Dead	16	9	10	

NA: Not Applicable; HRT: Régional Hôpital of Thiès

out in the service of infectious diseases at Fann CHNU, a national reference structure for the curative management of this disease, its epidemiology is insufficiently studied in Senegal, where surveillance is limited in the decentralized zone.

In our study, hospital prevalence was 0.4% in the Thies area. It appears much lower than that by Fortes Deguenonvo who had reported a prevalence of 9.27% only in the service of infectious diseases in Fann [3].

Similarly, Aba in Côte d'Ivoire had found a hospital prevalence of tetanus at 6.3% [8]. In developed countries, however, cases of tetanus have become exceptional [9], in France the incidence is very low of 0.14 cases per 1 million population [10].

In the region of Thies, tetanus is endemic throughout the year as in most African countries. Prevalence peaks are observed in February (11, 6 %), May (15, 1%) and August (10, 2%).

They contrast with those reported in the studies carried out in the tropics, which note an increase in cases of tetanus in the rainy season, in connection with the resumption of fieldwork in rural areas [8,11-13].

Our patients were predominantly 46.5% students and informal sector workers (16%) with a predominance of drivers and guards. These occupations are not considered the most at risk for tetanus, unlike manual occupations because of the risk of microtrauma

from sharp or pointed objects most often in contact with the earth and ignorance of preventive measures. The high prevalence among students could be related to the lack of immunization or incomplete immunization. The informal sector dominated by drivers and guards; the latter in their work use sharp objects (carcasses of cars, knives) which are quite old and often non-sterile carrying tetanus spores.

The sex ratio was 8.5 in favor of men. This male predominance is reported by several African series [4,8,13].

In developed countries, the predominance of women is often reported. In France in the Antona series, women accounted for 67% [10]. In general, the risk of tetanus is higher for men who are more likely to be at risk of trauma than women, so the policy for the eradication of neonatal tetanus in Africa helps to protect women of childbearing age [2,3].

Our patients were predominantly young with an average age of 27.7 ± 21.9 years.

In previous study: Dakar, Seydi found a lower average age of 20 years [4], while Dao in Mali [11] found a higher average age at 39 years. In the literature, juvenile tetanus occupies an important place in the population affected by this disease [2,4,12,13].

The mode of admission to health facilities was mostly spontaneous at 51%, followed by 32.6% transfer from health centers (Dispensary) to Hospital (more technically equipped) for resuscitation of patients.

Immunization was incomplete in 55% of patients. For the other patients, the vaccination status was not known. Overall, the coverage of universal administration of tetanus toxoid in adults is considered low in Senegal as in most African countries [2,4].

The infection transmission mode was diverse and varied but dominated by the integumentary transmission (66.3%) as conventionally described in the literature. Seydi in 2005 had reported 73.92% of integumentary transmission [4]. Excluding integumentary wounds, the traditional transmission (Circumcision) and the surgical transmission accounted for 5.8% of cases in our study. These pose a medico-legal problem [3,4]. They are due to surgical procedures performed under inadequate conditions where aseptic measures are not respected [3,6,13].

Clinical aspects

The incubation time was short in 74%, and a long invasion time in 51%. Soumaré reported the similar results with 72% having an incubation greater than or equal to 7 days and 65% of cases an invasion period of less than 48 hours [5].

Virtually all patients had severe generalized or moderate severity of disease (Stage II and III).

Therapeutic and evolutionary aspects

In our study, only 45% of tetanus wounds were well managed. However, correct and early management of these wounds can prevent the risk of developing the disease. This is the place to point out the interest of the use of immunochromatographic test for the detection of tetanus-specific antibodies in the blood in order to evaluate the immune status of the patient. The test is performed only after estimating the tetanus risk of a wound [14]. This test, widely used in

developed countries, may be important in our wound management practices, especially in elderly people whose immunization status is not known [14].

For symptomatic treatment, all our patients were on diazepam and a muscle relaxant. The uses are explained by the availability and affordability of the population. Magnesium sulfate was used in 2 patients.

Thansya M.D in kinshasa [15] reported that the benefit-risk balance was in favor of magnesium sulfate compared to diazepam.

The isolation from light and noise was systematic in all patients. Due to a lack of an equipped intensive care unit, only patients admitted to HRT were under mechanical ventilation by or tracheal intubation.

These two paths are possible and used in several series.

Previous uncontrolled studies have shown an association between the intrathecal route and reduced mortality [16].

The reference transmission for Fann's infectious diseases department. More recently, the benefits of the intrathecal route combined with intramuscular HTIg (Human Tetanus Immunoglobulin) have been evaluated in a randomized study and only a reduction in hospitalization has been observed [17]. Differences also exist with regard to the dosage, which is 250 IU.

Studies have experimented with higher dosages that would show superiority [18]. In addition, intrathecal serotherapy is only possible in hospital structures that have the minimum equipment and skills to perform it [2,13].

In our series, doses of equine antitetanus serum administered IM had varied, ranging from 500 to 6000 IU, but lower than the doses used in Vietnam. Serotherapy was administered to all patients as a single injection of equine Anti Tetanus Serum (ATS) Intramuscularly (IM) at a dose of 20,000 IU in adults [3].

All these results show that algorithms and consensual approaches based on more in-depth studies on serotherapy in the therapeutic management of tetanus should be defined.

The vast majority of patients (89%) received tetanus vaccination on admission. WHO recommends an intramuscular injection of 500 IU human SAT [2]. The latter has severe allergic reactions and should only be used as a high-dose single-dose after hypersensitivity testing.

Antibiotic treatment is also recommended during tetanus. In our series, metronidazole was the most used antibiotic 48% or in combination with penicillin G at 28%. No difference is conventionally observed between patients treated with penicillin, metronidazole or other regimens.

Complications can arise at any time from the evolution of tetanus. In our series, almost all patients (84.4%) had at least one complication.

Infectious complications were mainly represented by pneumonia at 30% and urinary tract infections at 12%. Strong Deguenonvo in his series reported 46% of cases of complications among which 63% of cases of pneumopathies. These pulmonary infections are most often nosocomial. Salivary stasis, contracture of laryngeal, thoracic and

bladder muscles, and prolonged decubitus are contributing factors for these pulmonary diseases [20,21]. The germs were not identified in our study.

Classically unrecognized, cardiovascular lesions are relatively common during tetanus [5,22]. During our study, we observed 40% cardiorespiratory arrest. Since the ECG is not performed in patients, we have not found the rhythm disorders frequently described in the other series [3,5,22].

Metabolic and nutritional complications were not negligible in during study with a predominance of ionic disorders in 53%, followed by 33% dehydration.

In Tanon A.K's study [13], only 1.3% of patients had developed metabolic complications. These disorders were related to an unbalanced intake defect related to dysphagia that prevents any oral feeding, hence the need to intubate patients or to provide parenteral supplementation [23].

Osteoarticular complications were not present in during study.

Factors associated with the risk of death

Out of the 86 patients, 35 died, giving an overall lethality of 41% in the Thiès region. The latter is high compared to the results reported from Dakar. Seydi, 2005 [4] and Deguenonvo, 2015 [3] reported respectively 22% and 21%. Our results were found similar to those of Dao in Mali [11] (38.9%), Saltoglu [21] in Nigeria (42.9%).

Lethality was higher in subjects older than 71 years ($p=0.01$). These results are consistent with the literature [3,10,13]. Older age is a factor associated with the risk of death due to the fragility of the terrain and the existence of other defects [14].

Complications are a statistically significant cause of death ($p=0.000$) which was similar with previous study reported by Deguenonvo in Dakar [3].

Conclusion

This study further demonstrates the importance of tetanus immunization and the value of treating all traumatic and non-traumatic cases with local care and immunization in order to reduce health expenditure.

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