

# Neonatal Tetanus in African Children: Causes, Symptoms, Predisposing Factors, Prevention and Control

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## Abstract

This is a paper which examines the causes, symptoms, predisposing factors, prevention, and control of neonatal tetanus in African children. Neonatal tetanus was found to be the leading cause of death among neonates. It was found to result mainly from social and environmental factors, such as poor hygiene, use of non-sterile materials in treating the stump of umbilical cords in newborns, poor attendance to antenatal clinic, high-level illiteracy, and non-utilization of tetanus toxoid immunization. Based on the findings recommendations were proffered, which include: legislation in favor of anti-tetanus immunization as prerequisite for contracting marriages in courts in African countries; strategic and vigorous immunization exercise should be embarked upon at various levels; public enlightenment campaign targeted at exposing the nature of the disease to the entire public be carried out by ministries of health at state and federal level, Non-Governmental Organizations, and other health agencies.

**Keywords:** Neonatal tetanus; African children; causes; symptoms; predisposing factors; prevention; control.

## 1. Introduction

Tetanus occurs worldwide, with higher rate in Africa and the western Pacific. It is an acute disease of the nervous system caused by the contamination of wounds by the spores of a soil bacterium known as *Clostridium tetani*. A neonate is a newborn baby usually under one month of age. Neonatal tetanus thus refers to a case of tetanus infection of usually newborn babies [12]. It is a common infection among neonates due to contamination of the umbilical cord. Neonatal tetanus is an acute disease of the nervous system caused by contamination of the umbilical cord by anaerobic spore forming gram-positive bacillus called *Clostridium tetani*. The organism produces an acute central nervous system intoxication resulting in the typical muscular spasms, a symptom associated with the illness [6].

The disease-causing agent, *Clostridium tetani*, is a gram-positive rod with spherical, terminal spores that give it a characteristic drumstick appearance. It is found naturally in the soil, where it survives in anaerobic conditions. Different types of soil have been found to harbor the causative organism, but it is found more in cultivated soil, especially those manured with animal faeces. *Clostridium tetani* is found in horse and cattle dung, and to a lesser extent in pig, sheep, and dog faeces. It is occasionally found in human faeces, especially in humans associated with animals [11].

Tetanus is a self-limiting disease, where if the patient can be kept alive for 3 weeks, can completely recover. However, keeping the patient alive for this period is the problem. It is the toxin that causes the symptoms, and once the toxin is fixed in the nerves, only support can be given to the patient to maintain respiration, urinary output, and nutrient intake. The patient is sedated to reduce the spasms and in all ways expertly nursed. On the contrary, if a patient suffering from the condition (neonatal tetanus) is handled by non-medical experts, or those ignorant of effects of such stimuli that can aggravate the condition such as touch or noise, such patient may go through avoidable trauma and shock resulting in death [11,7]. The question is how many people are acquainted with these signs and symptoms. This is one of the gaps this article is expected to bridge.

It has been seen as a common practice especially among rural women to use cattle dung to treat umbilical cord stump of children. Some use soil, ash, and other types of concoction. This definitely will mean a high incidence of neonatal tetanus in such areas, which is the reason Africa is rated the highest in tetanus/neonatal tetanus occurrence worldwide.

## 2. Incubation period

The incubation period of the organism is usually 6 to 10 days. In some cases, it can be as short as one day or as long as seven months [8]. The incubation period is variable, from 4 to 21 days, but most cases occur within 14 days. There is a relationship between incubation period and severity. An incubation period of less than 9 days has a mortality rate of 60%, while incubation period lasting more than 9 days has a rate of 25% [11].

The implication is that death resulting from neonatal tetanus/tetanus infection kills faster than anything does. Literature shows that more people die within the first 9 days of incubation. One could also infer that the medical experts may be handicapped in redeeming situations where infection has already occurred. WHO [13] in the same vein posited that the incubation period is mostly 1 to 3 weeks. The period of onset according to WHO, is the duration of time between the first symptom and the occurrence of spasms. That period has an important prognostic value, because the shorter the period of onset, the higher the fatality/mortality rate.

### **3. Signs and symptoms**

Neonatal tetanus generally presents a difficulty in sucking, rigidity of muscles leading to development of general convulsion. This usually commences within 5 to 10 days of birth. It kills about 80% of those afflicted [8]. This rate is very high, and may be higher than any other single infectious disease, especially among neonates.

The first symptom is excessive crying, which progresses to inability to suck due to spasms of the masseter muscles. This follows a rapid development of stiffness and generalized spasms [1]. World Health Organization [13] observed that the spasms at first are infrequent, but later increase, and are often precipitated by any stimulus such as noise and light cold. Spasms may last from a few seconds to over a minute. The spasms may be spontaneous or provocative. During spasm, breathing is impaired, the child may have apneotic attack, become cyanotic or pale, and the child may even die during such an attack.

Restlessness, irritability, and headache are normally early manifestations [2]. The baby may be afebrile (without fever), or high temperature may be at extreme heights of  $39^{\circ}\text{C}$  to  $41^{\circ}\text{C}$ , with variations in between. Dysphasia (difficulty in swallowing) may be experienced due to spasms of the larynx, and tight abdominal muscles are experienced in variable degrees resulting in constipation. Umbilical herniation is exacerbated with the state of spasm, and the protrusions may frequently attain high proportions. During the occurrence of autonomic nervous system overstimulation, there is sweating, irregular heart and respiratory rate, usually more rapid than normal, may be shallow or accompanied by gasping, retraction or stridor. Rectal prolapse may occur. There is no muscle rupture or spine breaking; the consciousness is intact despite these problems. This intact consciousness according to the researchers may present a condition that is deceptive and unsuspecting. This is very risky and misleading, and could lead to sudden and unexpected death.

The adult has muscle spasm and rigidity; there may be trismus in which the muscle of the jaw and later the back become rigid, leading to lockjaw and opisthotones. Muscle spasm can produce the characteristic half smile; half snarl of *risus sardonicus* or generalized opisthotones. These acute spasms are initiated by external stimuli such as touch or attempts at intubations [11].

### **4. Causes and predisposing factors**

Tetanus is a positive environmental hazard [8]. Its occurrence depends upon man's physical and ecological surroundings. Environmental factors are compounded by social factors such as unhygienic customs and habits, which include application of dust, ashes, or animal dung to wounds; unhygienic delivery practices such as using unsterilized instruments for cutting the umbilical cord; lack of primary health care services, etc [8,3].

According to UNICEF [10], over 2.6 billion people worldwide do not have access to improved sanitation, with about 2 billion living in rural areas. This means that these populations are exposed to high risk of tetanus infection in neonates, children, as well as adults who work, play, and dwell in such unhygienic environments. Health education and public enlightenment is the surest remedy.

Other notable scholars also affirmed that high incidence of morbidity and mortality rate from tetanus is due to poor hygiene, harmful traditional health practices, superstition, and high level of illiteracy. Other contributory factors include non or poor attendance at antenatal clinic, non-utilization of tetanus toxoid immunization during pregnancy, and treatment of the umbilical cord with potentially infectious materials such as cow dung, sand, among others [3,4]. High level of illiteracy and non-availability/accessibility of antenatal facilities are issues that border on government's imbalanced distribution of facilities. This social inequality must be addressed by the government to eliminate the absence of 'enabling factors' that can influence positive health practices. The presence of facilities and services can encourage healthy health practices like handling of umbilical cord in a hygienic environment.

*Clostridium tetani*, which produces the symptoms of tetanus by means of a potent toxin, has a wide spread natural distribution in soil and in the gastrointestinal tracts of domestic animals and man. It is said that 5 percent of humans are tetanus carriers; the figure goes up to 30 percent for those in close contact with animals. The tetanus spores can pass through the intestine

unharmed by gastric acid and digestive enzymes. Cultivated soil, especially when manured, harbours more bacilli, and tropical climate encourages their existence. The tetanus bacilli form spores which are very resistant to heat, light, strong chemical antiseptics and to degrees of dryness or moisture. The spores do not germinate in normal living tissue, but need a lower oxygen tension such as that produced by necrosis or bacteria or chemical changes in wound [9,7].

Neonatal tetanus is a highly lethal disease and is chiefly caused by unhygienic delivery and cord care, and perhaps other environmental conditions to which the babies are exposed at home [7,5]. The unhygienic practices of delivery and cord care are amenable to modification through proper health education. Neonatal tetanus is a common disease in developing countries, especially Africa. The prevalence of this condition has been found to result from poor hygiene, harmful birth practices such as conducting delivery at home with the assistance of untrained midwives who have little or no idea of primary hygiene procedures, cutting of the cord with an old razor blade, tying it with unsterile thread, and subsequent dressing with cow dung, ashes or red earth, saliva, salt and herbal concoctions. All these favor the infection of the umbilicus with *Clostridium tetani* [7,5].

## **5. Prevention, control and treatment**

The most effective way of preventing neonatal tetanus is the immunization of women of childbearing age. The policy is to give all women a lifetime five doses of tetanus toxoid. This is preferable to waiting until the woman becomes pregnant, since observation shows that rural women do not attend antenatal clinic, especially those likely to use traditional applications to the umbilical cord stump. Preventive measures in neonatal tetanus are easier, cheaper and more effective than curative measures. Since adults present signs of spasms and rigidity accompanied by trismus, which is often initiated by external stimuli such as touch or attempts at intubations, every care must be taken to protect the patient from such stimuli [9,11]. Researchers advocate that serious public/health enlightenment campaign on the disease be carried out by governmental agencies and Non-Governmental Organizations (NGOs), especially in rural areas. Parents, especially mothers, should be the primary target since it is health behavior related problem and health education approach would be the most effective tool. Tetanus immunization for children is given in two doses of absorbed tetanus toxoid (0.5 ml) separated by 4 weeks, and a third dose of 1 ml six months later. This is preferably given as part of the routine childhood immunization, in case it is missed, it can be given at any age in life. Immunization once taken can provide immunity for at least ten years and sometimes 20. Booster doses every year can maintain a high level of immunity [9,11].

In case of contamination, the contaminated wound must be cleaned and excised, antitoxin or immunoglobulin administered, and penicillin given to kill any remaining organisms. The mortality of tetanus is sadly high, 40 percent in adults and 90 percent in neonates, once contamination occurs [11]. Therefore, the objective should be to try to prevent it. In the event of a person being injured and contamination of wound that could produce tetanus, the following actions should be taken [11,6,1]:

- Clean out the wound.
- Give penicillin.
- If the person has been immunized within the last 10 years, give a booster dose of toxoid only.
- If there is no record of tetanus immunization or protection is in doubt, give the first dose of tetanus toxoid, plus 250 units of human tetanus immunoglobulin or 1500 units of equine tetanus antitoxin, following a test dose. Medical experts ideally would instruct the person to return at four weeks and six months to complete the course of immunization.

## **6. Conclusion**

In developing countries, the most serious disease among the newborn is neonatal tetanus. It is found to be mainly as a result of customary practices of treating the umbilical cord in the new born. Poor hygiene was also found to be a predisposing factor. It is prevalent in rural areas where illiteracy and poor environmental conditions, and non-availability/accessibility of antenatal facilities are a serious problem. Neonatal tetanus is better prevented than cured since resulting mortality is very high.

## **7. Recommendations**

Based on findings the following recommendations are proffered:

- i. Since the disease is better prevented than treated, immunization programme especially for mothers and would be mothers should be vigorously pursued.

- ii. A legislation should be mounted to make tetanus toxoid immunization a requirement for the contraction of marriages in courts in Nigeria, for intending couples.
- iii. Public lecture campaign and public health education of the entire population on neonatal tetanus should be vigorously pursued by the ministry of health, UNICEF, and other health agencies through the media.
- iv. Government should educate workers through the various ministries, on the need to update immunization, and probably liaise with ministries of health to mount periodic tetanus toxoid immunization exercise against the disease in various African countries.
- v. Veterinary specialist should educate cattle farmers, especially farmers who use animal feces as manures on the risk such practices expose them to as per tetanus infection, and teach them how they can best protect themselves.
- vi. The governments should close the wide gap in distribution of social amenities such as hospitals, good roads, educational facilities, etc. existing between the urban and rural areas across the continent.

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