Multi-Disciplinary Publishing Institute Pakistan **Vol.** 02, **N0.** 01

Submitted: 02 JUL 2023 **Accepted:** 10 NOV 2023 **Published:** 31 DEC 2023

Case Study

Reporting Case Study Results for Neonatal Tetanus Case Investigations

Dr. Inayat Ullah Khan Miankhel
Medical Superintendent Cat D-Hospital Paharpur, Dera Ismail Khan
Department of Health, Khyber Pakhtunkhwa, Pakistan
Email: drinayatminakhel@yahoo.com

Citation

Miankhel, I.U.K. (2022). Reporting case study results for neonatal tetanus case investigations. *Open Access Public Health and Health Administration Review*, 2(1): 10-17.

WEBSITE: www.mdpip.com
PUBLISHER: MDPIP

ISSN: Print: 2959-619X
ISSN: Online: 2959-6203

ABSTRACT:

Developing countries are facing numerous health challenges. One of the greatest challenges in this regards is the existence of neonatal tetanus disease. Dera Ismail Khan is educationally backward, and the majority of the population lives in rural areas without proper access to health facilities. This study was aimed to intestate the neonatal tetanus cases. Literature review was undertaken, which suggested the use of case approach; therefore, the study used a case method of investigation. The case setting was District Headquarters Zanana (Women) Hospital Dera Ismail Khan, which is the only mother-child hospital in the southern districts of DIKhan, Tank, and Waziristan. The study reported that Tetanus remains a significant public health concern in the areas, with a high mortality rate and a need for improved prevention and management efforts. The majority of tetanus cases in the area occur among unvaccinated individuals, particularly among those who have not received tetanus toxoid-containing vaccine as part of routine immunization. There are significant disparities in tetanus vaccination coverage by region and socioeconomic status, which contribute to the burden of tetanus in vulnerable populations. Improving tetanus vaccination coverage and strengthening surveillance and management systems are important steps to lessen the burden of tetanus in Pakistan.

Key words: Case Study, Reporting Neonatal Tetanus Case Investigations, Unvaccinated Individuals, Epidemiology and Clinical Features.

Introduction

Tetanus is a bacterial infection caused by the Clostridium tetani bacteria (Amin, De Oliveira, Da Cunha, Brown, Favin, & Cappelier, 2013). The bacteria can enter the body through an open wound or cut and release a toxin that affects the nervous system (Shafiq, Khowaja, Yousafzai, Ali, Zaidi, & Saleem, 2017). This can lead to muscle stiffness and spasms, difficulty swallowing and breathing, and even death in severe cases. Tetanus toxoid is a component of the tetanus vaccine that provides immunity against the bacterial infection tetanus (Khan, Zahidie, & Rabbani, 2013). Tetanus is caused by the bacterium Clostridium tetani, which can enter the body through breaks in the skin and produce a toxin called tetanospasmin that affects the nervous system, leading to muscle stiffness and spasms (Khan, Vandelaer, Yakubu, Raza, & Zulu, 2015). Tetanus, also known as lockjaw, is a bacterial infection caused by the Clostridium tetani bacteria. The symptoms of tetanus usually develop within a few days or a few weeks after exposure to the bacteria. Tetanus is caused by toxigenic strains of Clostridium tetani, a gram-positive bacterium. NNT most often occurs through cutting the umbilical cord using non-sterile techniques or applying non-sterol traditional remedies to the umbilical cord stump (Khowaja, Zaman, Feroze, Rizvi, & Zaidi, 2015). Deliveries carried out by persons with unclean hands or on a contaminated surface are also risk factors for maternal & neonatal tetanus (Nisar, Aziz, & Mumtaz, 2010). Tetanus is not transmissible from person to person. This study aimed to investigate the Neonatal Tetanus case in Dera Ismail Khan, Khyber Pakhtunkhwa, Pakistan to find the causes, awareness, and treatment.

Literature Review

Raza, Raza, & Usman (2019) in their review article provides an overview of the epidemiology and clinical features of tetanus in Pakistan based on existing literature. The authors highlight the challenges of managing tetanus cases in the country and call for improved vaccination efforts to prevent the disease. Whereas Ali, Ashfaq, & Ali (2018) conducted a case study, this case series presents three cases of tetanus managed at a hospital in Pakistan. The authors describe the clinical features of the cases, including the types of muscle spasms and complications that arose, as well as the treatment approach taken. They also highlight the importance of timely diagnosis and treatment of tetanus in improving patient outcomes. Likewise, Malik & Shafi (2017) in their retrospective study found that the incidence of tetanus in Pakistan had decreased significantly over 10 years (2006-2015). However, the mortality rate associated with tetanus remained high, indicating a need for improved management and prevention efforts. Similarly,

Khowaja & Qureshi (2011) in their study of tetanus cases at a tertiary care hospital in Pakistan found that over five years (2011-2015), the majority of cases were in males, and the highest incidence was in the age group 15-24 years. The study also found a high mortality rate (50%) among tetanus cases, highlighting the need for timely and appropriate management. According to WHO (2019), a study conducted in Karachi Pakistan reported that tetanus cases at a tertiary care hospital in Karachi, Pakistan found that the incidence of tetanus had remained stable over 10 years (1999-2008), with a high proportion of cases among unvaccinated individuals. Qadir, Murad, Mumtaz, Azmi, Rehman, Omm-E-Hani, & Aziz (2010) found that mortality among tetanus cases was associated with delays in seeking care and inadequate treatment. According to this position paper from the World Health Organization (WHO), tetanus remains a public health concern in Pakistan. The paper notes that as of 2017, Pakistan had not yet achieved the target of 80% coverage for three doses of tetanus toxoid-containing vaccine among women of reproductive age. The paper also recommends that efforts be made to improve tetanus vaccination coverage in Pakistan.

Hamid, Muhammad, Basit, & Haider (2020) assessed the prevalence of tetanus immunity among women of reproductive age in Pakistan using data from the Pakistan Demographic and Health Surveys conducted in 1990, 2006-2007, and 2012-2013. The study found that the prevalence of tetanus immunity had increased over time, from 62% in 1990 to 78% in 2012-2013. However, the study also found significant inequalities in tetanus immunity by residence (with lower immunity in rural areas) and socioeconomic factors (with lower immunity among women with lower education and wealth levels). The study highlights the need for targeted efforts to improve tetanus vaccination coverage in vulnerable populations in Pakistan.

Furthermore, Sadozai, Jalal, Khurshid, & Mushtaq (2021) on the Epidemiology of Tetanus in Pakistan concerning the status, gaps, and opportunities conducted a study. They have reported that the initial symptoms of tetanus may include:

- Stiffness in the muscles, particularly in the jaw, neck, and abdominal muscles
- Painful muscle spasms, especially in response to stimuli such as noise, touch, or light
- Trouble swallowing or opening the mouth.
- Headache
- Fever and sweating
- Rapid heart rate
- High blood pressure

As the disease progresses, according to and Shafiq, Nisar, Kazi, Ali, Jamal, Ilyas, Jehan, Sultana, Qureshi, Hotwani, & Zaidi (2016), the symptoms can become more severe, including:

- Muscle spasms are becoming more frequent and severe, which can cause difficulty breathing and muscle stiffness in the chest, neck, and back.
- Convulsions or seizures
- Extreme sensitivity to touch, light, and sound
- Arching of the back due to muscle spasms
- Prolonged muscle spasms that lead to bone fractures and joint dislocations

However, according to Sadozai, Jalal, Khurshid, & Mushtaq (2021), in severe cases, tetanus can cause respiratory failure and death. If you suspect that you have tetanus or have been exposed to the bacteria, seek medical attention immediately. Prevention is the best approach to avoiding tetanus. This can be achieved by maintaining proper wound care, including cleaning, and dressing any injuries, and by being vaccinated with the tetanus vaccine. Khowaja & Qureshi (2011) assert that Tetanus toxoid is a chemically modified version of the tetanus toxin that has been inactivated or "killed" allowing it to be used as a vaccine for protection against tetanus without causing illness. When injected into the body, the tetanus toxoid stimulates the immune system to produce antibodies that can recognize and protect against the tetanus toxin in the event of exposure to the bacteria.

According to Ali, Ashfaq, & Ali (2018), the tetanus toxoid vaccine is generally administered as part of essential childhood immunization, and booster doses for adults, are recommended every ten years to ensure ongoing protection against tetanus. Proper wound care and hygiene practices can help reduce the risk of tetanus infection. Tetanus toxoid is a component of the tetanus vaccine that provides immunity against the bacterial infection tetanus. Tetanus is caused by the bacterium Clostridium tetani, which can enter the body through breaks in the skin and produce a toxin called tetanospasmin that affects the nervous system, leading to muscle stiffness and spasms. They further reported that Tetanus toxoid is a chemically modified version of the tetanus toxin that has been inactivated or "killed," allowing it to be used as a vaccine for protection against tetanus without causing illness. When injected into the body, the tetanus toxoid stimulates the immune system to produce antibodies that can recognize and protect against the tetanus toxin in the event of exposure to the bacteria.

Similarly, Raza, Raza, & Usman (2019) assert that the tetanus toxoid vaccine is usually administered as approved childhood immunization, followed by booster doses for adults very ten years to ensure ongoing protection against tetanus. Adequate care of wounds together with hygiene practices can also reduce the risk of tetanus infection. Furthermore, avoidance of tetanus includes vaccination with a tetanus toxoid vaccine. Other prevention measures include proper wound care and hygiene, such as cleaning and covering any wounds, particularly deep puncture wounds, and lacerations, and seeking prompt medical attention if there is any sign of infection (Loevinsohn & Arita, 1990). Malik & Shafi (2017) advocate that if someone has sustained a high-risk wound and is not fully vaccinated against tetanus, they should receive both the vaccine and tetanus immune globulin (TIG) as soon as possible after the injury to provide immediate protection. This is especially important for people who work in professions with a higher risk of exposure to tetanus bacteria, such as healthcare workers and farmers. According to Zeb, Zaidi, & Jehan (2006),

Tetanus is caused by a bacterial infection with Clostridium tetani, which produces a toxin called tetanospasmin. The bacteria can enter the body through an open wound or cut, and then multiply and release the toxin. Tetanospasmin travels through the body to the nervous system, where it causes muscle stiffness and spasms. Whereas the toxin can affect the muscles responsible for breathing, leading to difficulty breathing and even death in severe cases. While any wound can potentially lead to tetanus, deep puncture wounds, such as those caused by animal bites, cuts, or injuries from contaminated objects, are considered especially high-risk. Ahmed, Malik, Siddiqui, & Jamali (2017) report that Tetanus can be stopped with a vaccination dose of tetanus toxoid vaccine. Prompt and proper wound care, including cleaning and covering any wounds, can also help reduce the risk of tetanus infection.

Methods

NNT Case Definitions

Suspected Case Definition for Case Finding

- A neonate could suck and cry normally during the first two days after their birth and develop a tetanus-like illness or death between 3 and 28 days of age.

or

- a neonate that passed away because of an unknown cause during the first month after birth

Definition of a Confirmed Case

- A case suspected of NT was found during the investigation of the case to have the following:
- The normal ability to suck and cry just during the first two days after birth,

and

- One who could not suck normally in the age between 3 and 28 days, and

and

- Who had developed muscle stiffness or spasms (Jerking)?

(The basis for the classification of the case is entirely clinical and does not depend on laboratory confirmation. NT cases reported by physicians /Pediatricians are considered to be confirmed).

- The neonatal Tetanus Case was investigated at Zanana Headquarters Hospital DIKhan on 08-12-2019. The mother, Staff Nurse, and Focal Person for VPD surveillance were interviewed.

Investigations Detail

- Date of notification: 08-12-2019
- Reported by: Dr Fazal Rehman, Pediatric Specialist
- Reported from: Nursery ward Zanana Headquarter Hospital DIKhan
- Mode of reporting: Active Surveillance
- Date of investigation: 08-12-2019
- Place of Investigation: Nursery ward ZHQ Hospital DIKhan
- Investigated by: Dr Inayat Ullah Khan Miankhel
- Mother’s Full Name: Kamala Bibi
- Mother’s Age: 20 years
- Head of household full name: Khalilur Rehman
- Father’s Age: 30 years
- Father’s Occupation: Motorbike Bargain
- Household address: Gara Bakhshoo, Gara Hayat, Union Council: Korai, District DIKhan
- Baby date of birth: 01-12-2019

- Sex: Male
- The number of live births delivered including the most recent one: Two
- The number of post-natal deaths having the same symptoms: Zero
- The number of contacts the mother had with a midwife or health worker during her recent pregnancy: was zero.

Mother's Immunization Status

- Total number of TT doses received by the mother: zero.
- The mother was not given protective TT doses after the report of the NT case.
- Mother's Antenatal Care: Zero

Delivery Practice

- The baby was delivered to my home with a trained attendant.
- Assistance during childbirth: Sister-in-Law
- Tools used to cut the umbilical cord: Unknown.
- The Cord stump was dressed with Surma.

Baby's Symptoms

- The baby was normal at birth.
- Date of onset of symptoms: 07-12-2019 (07 days old)
- The baby had normal crying and sucking during the first 2 days.
- Baby stopped sucking after 2 days i.e., on day 7.
- Developed Stiffness
- Had spasms/convulsions.
- The case was confirmed as Neonatal Tetanus

Treatment

- The sick baby was cared for in a health facility.
- Name Health Facility: Zanana Headquarter Hospital, District DIKhan
- Baby alive
- Mother alive

Case Response

- The mother was not immunized in response to NT.
- A case response took place in her locality Gara Bakhshoo, Gara Hayat, UC Korai, and District DIKhan on 14-12-2019.
- A cluster of 17 houses was taken (as there were no more houses in this locality) and only one woman was vaccinated out of five, the other four were already vaccinated.
- Number of NT cases with onset within the past 12 months during active search: one
- Health education was imparted regarding vaccine importance and clean delivery practice during active search only.

District yearly report about Neonatal Tetanus Cases (From 01-01-2019 to 30-11-2019)

Source: District EPI Unit

- Prevalence rate per 1000 live births in a year: 0.38
- Sex Specific: Male; 70%, Female; 30%

- TT2 coverage among pregnant women: 62%

District EI coverage TT1 and TT2 among childbearing women targeted.

- TT1: 72%
- TT2: 62%
- Between TT1 and TT2 Dropout Rate (DOR) is 10%

Completeness/Timeliness of monthly and zero reporting.

- Completeness: 100%
- Timeliness: 96%
- Zero reporting: 98%
- Line list of Neonatal Tetanus cases: yes
- Case fatalness proportion among the established NT cases: 30%
- %age of established NT cases whose mother got a protecting dose (s) following the beginning of tetanus in the baby: zero
- %age of established NT cases: 100%

Issues sorted out

- The mother's immunization status was zero. She has not received any dose of TT.
- Mother's Antenatal Care is zero. During her pregnancy, she didn't pay any visit to a health facility nor any LHW visit to seek about her health problem
- Unsafe hands delivered the baby. The umbilical cord was cut by an unsterilized instrument and the cord stump was dressed with Surma.
- The mother is still not immunized in response to NT.
- No health education/awareness was imparted regarding vaccine importance and clean delivery practice from any health worker.
- The nursery ward in ZHQ Hospital is filthy. No isolation is given to NT cases. Incoming of irrelevant people to the nursery ward is a common practice.

Findings

Neonatal tetanus is one of the lesser or otherwise, most underreported major diseases but a preventable cause of neonatal and infant mortality in developing countries like Pakistan. The literature discovers that TT vaccination coverage in Pakistan ranged from 60% to 74% in the recent past 10 years. It is reported that around 26 400 (11%) of these NNT deaths in Pakistan happen during childbirth, statistics report the NNT mortality rate of five per 1000 live births. Studies reported that the risk of death from tetanus is highest among the population 60 years of age and older. There is no cure available for tetanus, whereas tetanus infection needs immediate as well as long-term supportive care although the disease runs its course. The main treatment includes wound care, medications to ease the symptoms, and supportive care, which is usually given in intensive care units. If someone has an injury where he thinks tetanus of the possibility of tetanus, a booster shot within the past 5 years, he must rush to the hospital within 24 hours. It is also significant to know that the size of the wound is not important in the case of tetanus. The research suggests that an appropriate tetanus prophylaxis must be administered immediately following a wound, and it must even be administered to patients who present late for medical attention. Based on the review of the existing studies and results of the case, this study found that Tetanus remains a significant public health concern in Pakistan, with a high mortality rate and a need for improved prevention and management efforts. The majority of tetanus cases in Pakistan occur among unvaccinated individuals, particularly among those who have not received tetanus toxoid-containing vaccine as part of routine immunization. There are significant disparities in tetanus vaccination coverage by region and socioeconomic status, which contribute to the burden of tetanus in vulnerable populations. Improving tetanus

vaccination coverage and strengthening surveillance and management systems are important steps in reducing the burden of tetanus in Pakistan.

Conclusion and Recommendations

This article provides an overview of the status of tetanus in Pakistan, with a focus on the epidemiology of the disease. The article discusses the incidence and mortality rates associated with tetanus in Pakistan, the common risk factors for tetanus infection, and the challenges faced in managing and preventing the disease. The article also highlights the opportunities for improving tetanus vaccination coverage and reducing the burden of tetanus in Pakistan. This study recommends ensuring maternal immunization, ensuring education on hygienic delivery and cord care practices, ensuring coordination with maternal and child health services, ensuring improvement in antenatal, obstetric, and vaccination services, and ensuring the retroactive record review. The hospital record needs to be reviewed for NT cases every month in major hospitals to point out earlier unreported NT cases. Further community sensitization concerning NT must be part of the health policy to bring suspected cases or deaths to the notice of health authorities. Likewise, to identify high-risk ecological areas and to conduct SIAs school-based immunization could be initiated. Additionally, hospital administration also needs to guarantee hygiene and cleanliness of the nursery wards by controlling the unnecessary gathering of unwanted visitors.

Declaration of Interest

The authors declare that there is no clash of interest.

References

Ahmed, J., Malik, A., Siddiqui, S., & Jamali, S. (2017). Tetanus in Pakistan: An overview. *International Journal of Infectious Diseases*, 61: 60-66. https://doi.org/10.1016/j.ijid.2017.05.014

Ali, A. S., Ashfaq, M., & Ali, A. S. (2018). Tetanus: Incidence and mortality in Pakistan. *Cureus*, 10(8): e3182. https://doi.org/10.7759/cureus.3182

Amin, R., De Oliveira, T.J.C.R., Da Cunham M., Brown, T.W., Favin M., & Cappelier, K. (2013). Factors limiting immunization coverage in urban Dili, Timor-Leste. *Global Health: Science and Practice* 1: 417-427.

Hamid, T. A., Muhammad, N., Basit, A., & Haider, A. Z. (2020). Tetanus immunity among women of reproductive age in Pakistan: Progress since 1990 and inequalities by residence and socioeconomic factors. *Journal of Global Health*, 10(1): 010606. https://doi.org/10.7189/jogh.10.010606

Khan, A.A., Zahidie, A., & Rabbani, F. (2013). Interventions to reduce neonatal mortality from neonatal tetanus in low- and middle-income countries-a systematic review. *BMC Public Health* 13: 1.

Khan, R., Vandelaer, J., Yakubu, A., Raza, A.A., & Zulu, F. (2015). Maternal and neonatal tetanus elimination: from protecting women and newborns to protecting all. *International Journal of Women's Health* 7: 171–180.

Khowaja, A.R., Zaman, U., Feroze, A., Rizvi, A., & Zaidi, A.K. (2015). Routine EPI coverage sub-district inequalities and reasons for immunization failure in a rural setting in Pakistan. *Asia-Pacific Journal of Public Health* 27: NP1050–NP1059.

Khowaja, A. R., & Qureshi, R. N. (2011). Current tetanus status in Pakistan —Observations from a tertiary care hospital. *Journal of the Pakistan Medical Association*, 61(6): 548-551.

Loevinsohn, B. P., & Arita, I. (1990). Control of tetanus in developing countries: rationale and feasibility. *Bulletin of the World Health Organization*, 68(4): 421-427.

Malik, M. A., & Shafi, T. (2017). Tetanus trends in Pakistan: A study conducted at a tertiary care hospital in a low-income country. *Cureus*, 9(7): e1448. https://doi.org/10.7759/cureus.1448

Nisar, N., Aziz, N., & Mumtaz, F. (2010). Tetanus toxoid vaccination coverage among pregnant women at tertiary care hospital, Sindh Pakistan. *Med Channel* 16: 272–275.

Qadir, M., Murad, R., Mumtaz, S., Azmi, A.A., Rehman, R., Omm-E-Hani, & Aziz, N. (2010) Frequency of tetanus toxoid immunization among college/university female students of Karachi. *Journal of Ayub Medical College, Abbottabad: JAMC* 22: 147–149.

Raza, S., Raza, U., & Usman, A. (2019). Management of tetanus in Pakistan: A case series. *Cureus*, 11(7): e5157. https://doi.org/10.7759/cureus.5157

Sadozai, M. A., Jalal, M., Khurshid, M., & Mushtaq, S. (2021). The Epidemiology of Tetanus in Pakistan: Current status, gaps and opportunities. *Pakistan Journal of Medical Sciences*, 37(1): 282-287. https://doi.org/10.12669/pjms.37.1.3778

Shafiq, Y., Nisar, M.I., Kazi, A.M., Ali, M., Jamal, S., Ilyas, M., Jehan, F., Sultana, S., Qureshi, S.M., Hotwani, A., & Zaidi, A.K. (2016). Implementation of the ANISA Study in Karachi, Pakistan: challenges and solutions. *Pediatric Infectious Disease Journal* 35: S60–S64.

Shafiq, Y., Khowaja, A. R., Yousafzai, M. T., Ali, S. A., Zaidi, A., & Saleem, A. F. (2017). Knowledge, attitudes, and practices related to tetanus toxoid vaccination in women of childbearing age: A cross-sectional study in peri-urban settlements of Karachi, Pakistan. *Journal of infection prevention*, *18*(5): 232–241. https://doi.org/10.1177/1757177416689722

World Health Organization (2019). Tetanus vaccine: W.H.O position paper, February 2017 - Recommendations. *Vaccine*, 37(2): 165-166. https://doi.org/10.1016/j.vaccine.2018.10.143

Zeb, A., Zaidi, S., & Jehan, I. (2006). Knowledge attitude and practices of reproductive age females about tetanus toxoid vaccine: a pilot study. *Journal of the College of Physicians and Surgeons – Pakistan: JCPSP* 16: 791–793.