

## Impact of Manual Physiotherapy in Temporomandibular Joint (TMJ) After Tetanus Toxoid (TT) Vaccination in Pregnant Women in a Rural Community of Karachi: A Cross-Sectional Study

Rabiqa<sup>1</sup>, Syed Ziyad Furqan<sup>2</sup>, Shomaiza Andleeb<sup>3</sup>, Summaya<sup>4</sup>, Iqra<sup>5</sup>

<sup>1</sup> Associate Professor, Iqra University, Karachi, Pakistan, Corresponding Author's

Email: [rabiqasaleem22@gmail.com](mailto:rabiqasaleem22@gmail.com)

<sup>2</sup> Assistant Professor, Iqra University, Karachi, Pakistan

<sup>3</sup> Senior Lecturer, Iqra University, Karachi, Pakistan

<sup>4,5</sup> House Officer, Jinnah Post Graduate Medical College, Karachi, Pakistan

**DOI:** <https://doi.org/10.63163/jpehss.v4i1.13168>

### Abstract

A non-communicable disease, tetanus has no natural immunity; only prior vaccination can cure this disease. The mode of transmission is via wound contamination as well as poor-hygienic childbirth. Although tetanus toxoid (TT) vaccination is a primary preventive measure but certain musculoskeletal complications such as temporomandibular joint (TMJ) stiffness may arise post-vaccination. To assess the tetanus vaccination status and evaluate the effectiveness of manual physiotherapy in managing jaw lock among pregnant women aged 25 to 50 years. A cross-sectional descriptive study was conducted from January 2022 to August 2022. Data were collected from 35 participants using a cluster sampling method. A questionnaire was developed, validated by three subject experts, and then distributed in hard copy to the participants. To ensure accuracy, face-to-face interviews were also conducted. The study was carried out in the rural area of Karachi and at the Baldia Health Care Center. Results showed that 60% of participants were between 25–37 years of age, while 40% were above this range. Findings indicated that manual physiotherapy had a significant positive effect in managing temporomandibular joint (TMJ) disorders. Majority of the participants (60%) were in the range of 25-37 years while 40% were out of the range. It was observed that manual physiotherapy has a marvelous effect on curing TMJ disorder. This study reports TT coverage among all women of reproductive age group (25-50 years) in Karachi and observe the data among past history of pregnant women who have exposure to Temporomandibular Joint (TMJ).

**Key words:** Reproductive Age, Tetanus Toxoid, Vaccination, Knowledge, Temporomandibular Joint, Pregnant Women, Maternal Tetanus.

### Introduction

A complex structure that interlink the mandible to the temporal bone of the skull is temporomandibular joint (TMJ) which allows essential functions such as chewing, speaking, and swallowing. Pain, restricted jaw movement, and joint dysfunction are the characteristic indicators of TMJ disorders, often leading to significant discomfort and impaired quality of life. Causes may include trauma, muscular imbalance, arthritis, stress-related bruxism, or post-vaccination complications resulting in jaw stiffness or lock. Early recognition and management are crucial, as

untreated TMJ dysfunction can progress to chronic pain and functional limitations. Manual physiotherapy has been recognized as an effective non-invasive intervention to restore mobility, reduce pain, and improve functional outcomes in patients with TMJ disorders. Lockjaw (from old Greek "Tetano" signifies tight) is an ailment portrayed by a certain muscle contraction. Tetanospasmin, a neurotoxin which is delivered by gram positive rod shaped anaerobic bacterium "Clostridium tetani" is responsible for the side effects that are being encountered<sup>1</sup>. Disease for the most part happens through injury pollution, unhygienic state of labor or profound cut. Lockjaw is a preventable infection. No age is resistant except if safeguarded by past dose. Patients who have recuperated from lockjaw should be effectively vaccinated, on the grounds that the measures of poison liable for the sickness in man don't animate defensive resistance. Assurance by TT immunization starts 15 days after the subsequent portion and consummation of 2 dosages of TT immunization in plans guarantee resistance during entire regenerative existence of the ladies. In Karachi two significant weak gatherings for lockjaw; pregnant ladies and youngsters live in provincial piece of the local area. A continuous immunization program of Lockjaw Toxoid is carried out under Expanded Program on Immunization (EPI) in Karachi whose objective is of regenerative age<sup>3</sup>. It is a challenge to guarantee hygienic conveyances in Pakistan as it is an agricultural nation. In 1978, the Government of Pakistan initiated an EPI program with extraordinary worldwide plan to vaccinate every one of the reproductive age<sup>2</sup>.

A considerable number of mothers and pregnant women are still dying from preventable infectious diseases despite of significant global achievements in eradicating maternal tetanus<sup>3</sup>. Tetanus, also called Jaw lock is a serious nervous system infection which is caused by spore-forming, anaerobic bacillus Clostridium Tetani<sup>1</sup>. Tetanus can affect any age group if a person doesn't get the vaccination. If this infection occurs during pregnancy or within six weeks after gestation, its maternal tetanus (MT), a major public health issue which affects not only pregnant women but their newborns as well. It could be due to unsanitary conditions during delivery as well as due to incomplete series of TT vaccine. In 2019 it was estimated that over 7,541 or 0.52% individuals died from this appalling disease in Karachi alone, with the massive majority occurring in low-middle income countries [1]. In 1997, around 248000 neonatal tetanus (NT) deaths were estimated globally. Out of this number around 26400 NT deaths were reported in Pakistan. NT mortality rate in Pakistan is of 5 deaths per 1000 live births based on this report. By the year 2008, the WHO estimated that the global NT mortality had declined to 59000 as a result of tetanus. This become possible because of the control measures taken by this program. However, under reporting of cases made this situation difficult to understand.

In Pakistan, poverty and downgrading in the community affect the number of vaccination services. Therefore, among different subgroups of the population health condition varies significantly. It was noted by Pakistan's health and well-being sector that although the nation made massive improvements in minimizing maternal and child deaths during the period of 2000s in Pakistan one consider expressed that in spite of the fact that the nation made, the gap between the health outcomes of poor and non-poor remained significant. These results align with the results obtained from other countries of the world<sup>4</sup>. A cross-sectional study presumed that huge opening existed between well-off and hindered concerning maternal medical services organizations usage Another consider directed in Afghanistan uncovered that families having a spot to richest packs were more uncovered to use of antenatal medical services workplaces Being persuaded by the over affirmations, this paper conjectured that whether way of life record was connected with lockjaw pathogen containing immunization inclusion among reproductive women of Pakistan<sup>2</sup>. A woman standard of living was analyzed on the basis of five markers; energy, drinking water, disinfection, lodging and resources. The reasonable system given portrayed the causal pathway among openness and result variable<sup>5</sup>. This paper will direct strategy producers to suggest mass inoculation program

of TT, therefore will help Karachi push ahead and gain Sustainable Development Goal (SDG) 3.1 (diminishing maternal mortality proportion to < 70 for each 1000 Low Birth) and SDG 3.2 (lessening neonatal mortality to 12 for every 1000 Low Birth) by 2030<sup>1</sup>.

### **Role of Physiotherapy in TMJ**

A significant pain and functional limitations in the jaw joint are observed in Temporomandibular joint (TMJ) disorders. Physiotherapy has a massive role in the management of TMJ disorders by providing conservative and non-invasive treatment options. Physiotherapy interventions aim to alleviate pain associated with TMJ disorders<sup>8</sup>. Techniques such as manual therapy, soft tissue mobilization, and therapeutic exercises can help reduce muscle tension, which ultimately will improve blood circulation, and promote relaxation in the jaw muscles. Manual techniques use to mobilize the TMJ, promoting optimal joint movement and reducing joint stiffness. This can enhance jaw function and alleviate pain. Muscle Stretching and Strengthening, Specific exercises and stretches prescribed by physiotherapists target the muscles around the TMJ to improve flexibility, strengthen weak muscles, and restore normal muscle balance. These exercises can help reduce pain and improve jaw movement<sup>6</sup>. Very helpful for Posture Correction, Poor posture can contribute to TMJ disorders. Physiotherapists address any postural abnormalities and provide guidance on ergonomics and body mechanics to optimize jaw and neck alignment, thereby reducing stress on the TMJ. Physiotherapists play a crucial role in educating patients about their TMJ disorder, including lifestyle modifications, dietary recommendations, and strategies for stress reduction. Self-management techniques such as relaxation exercises, heat or cold therapy and pain management strategies are often taught to patients. In some cases, physiotherapists may utilize adjunctive modalities such as ultrasound, electrical stimulation, or laser therapy to assist in pain management and tissue healing. These modalities play an important role in complete treatment plan in conjunction with other interventions. It is also noteworthy that the effectiveness of physiotherapy interventions for TMJ disorders may vary depending on the individual's specific condition and response to treatment<sup>7</sup>.

### **Methods**

A questionnaire was administered to observe possible side effects after tetanus toxoid vaccination particularly highlighting the effect of manual physiotherapy in TMJ patients. In conjunction, face to face interviews were also conducted to counter check the data received from questionnaire. Multiple questions were covered in the questionnaire including age, sex, symptoms after vaccination, past history of TMJ, number of doses received, trimester of pregnancy among others. A rural area of Karachi, Baldia health care center was selected for this study from the period of January to August 2022. The total of 35 participants participated in this study which belong to different age groups in the range of 25-42 years. Data was collected, analyzed and compiled by using different tools such as pie charts, bar graphs and tables.

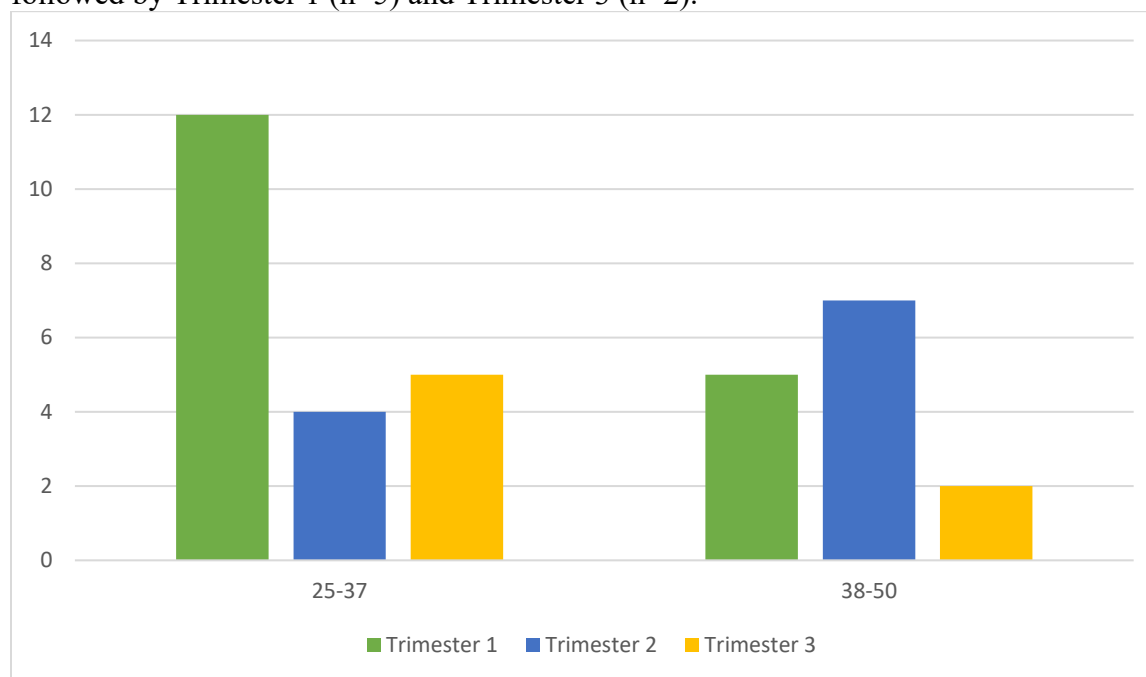
### **Results**

In this study 35 participants were included. Participants were divided into two age groups, 25-37 and 38-50 years. In the range of 25–37 years around 60% (n=21) of the participants were enrolled, while the remaining 40% (n=14) fell within the 38–50 year age group (Table I).

**Table I: Description of age groups of Participants**

<b>Age Group (Years)</b>	<b>Number of Participants</b>	<b>Percentage (%)</b>
25-37	21	60%
38-50	14	40%

The distribution of participants according to trimester in which they received TT vaccination is depicted in Figure I. In 25–37 year age group, the first trimester had the highest frequency of receiving Tetanus Toxoid (TT) vaccination (n=12), followed by Trimester 3 (n=5) and Trimester 2 (n=4). In contrast, in 38–50 year cohort, most vaccinations were received in Trimester 2 (n=7), followed by Trimester 1 (n=5) and Trimester 3 (n=2).



**Figure I: Information about the trimester of Pregnancy of all participants in which they received Tetanus Toxoid vaccination**

Regarding the Tetanus Toxoid (TT) Vaccination Record (Table II), in the 25–37 age group, 12 participants received the 1<sup>st</sup> dose, while 9 received the 2<sup>nd</sup> dose. For the 38–50 age group, 5 received the 1<sup>st</sup> dose, and 9 received the 2<sup>nd</sup> dose.

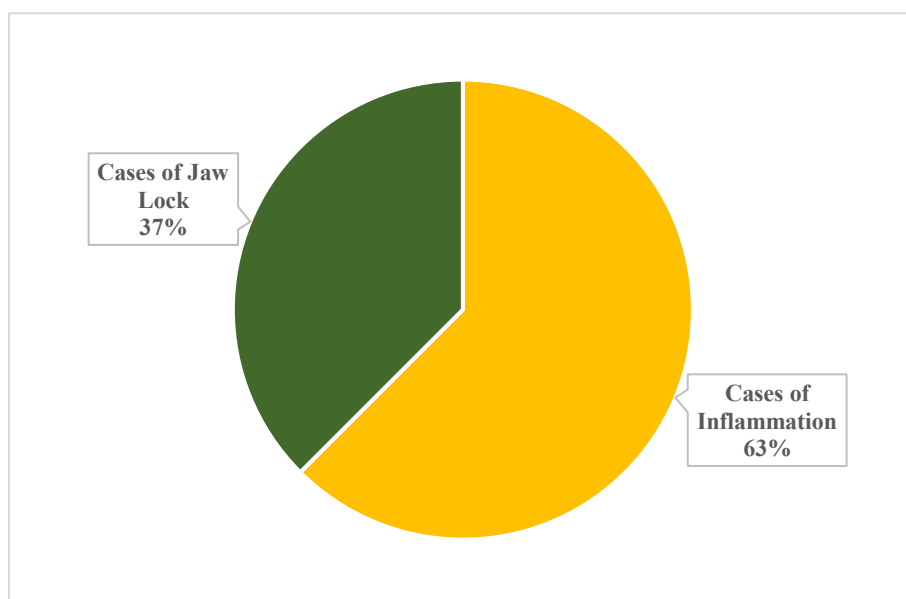
**Table II: Tetanus toxoid Vaccination Record**

Age Group (Years)	1 <sup>st</sup> dose Received	2 <sup>nd</sup> dose Received
25-37	12	9
38-50	5	9

As shown in Table III, inflammation cases were slightly higher in the 25–37 group (n=11) compared to the 38–50 group (n=9). All inflammation cases in both age groups were successfully cured with cold application. TMJ/Jaw Lock was reported in 8 participants from the 25–37 group and 7 participants from the 38–50 group. All cases were successfully cured with manual physiotherapy, showing a 100% recovery rate for both conditions in both age groups.

**Table III: Information about the number of cases of inflammation and TMJ/Jaw lock in each age group and their ratio of cure**

Age Group (Years)	Cases of Inflammation	Cure with Cold Application	Cases of TMJ/Jaw Lock	Cured with Physiotherapy
25-37	11	11	8	8
38-50	9	9	7	7



**Figure II: Total no of Cases of Inflammation and Jaw Lock**

Figure II shows that the number of cases of inflammation were higher (63%) than cases of temporomandibular joint (TMJ)/Jaw Lock (37%).

### **Discussion**

The purpose of this cross-sectional study was to know the current status of Tetanus toxoid vaccination in pregnant women. This study was conducted in a rural area of Karachi, Baldia health care center from the period of January 2022 to August 2022. In this period of time, we closely monitored our participants in order to gain accurate results. Data was collected from 35 participants selected by cluster type of cluster sampling, a mixed type of questionnaire was developed in which multiple variables were covered, age, gender, history of tetanus vaccination, number of doses received of Tetanus, trimester of pregnancy, past history of TMJ etc. Symptoms after receiving the vaccination were also recorded in both doses of vaccination and categorized according to the dose. The objective of the study was to analyze the effect of manual physiotherapy in TMJ after vaccination of TT in pregnant women and also to monitor other symptoms

### **Conclusion**

It was observed that the people of a rural area of Karachi were vaccinated with tetanus toxoid and the most common side effects after vaccination is inflammation and jaw lock both of which were fully curable. Manual physiotherapy has an added effect on the treatment of TMJ, which is safe for both baby and mother. It was observed that majority of the participants were unable to complete the second dose due to lack of resources and knowledge.

### **Recommendation**

This study can be further extended and conducted on other rural areas of Karachi in order to have the accurate data on the effect of manual physiotherapy in TMJ after tetanus vaccination from the population of rural areas of Karachi. Awareness will be increased but not all rural areas of Karachi have the facilities to avail this immunization regime. Government should encourage people by giving free vaccines particularly in the rural areas of Pakistan.

## Authors' Declaration

The authors declared no conflict of interest and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All authors contributed substantially to the planning of research, question designing, data collection, data analysis and write-up of the article.

## References

- [1] Sultana M, Mahumud RA, Sarker AR, Hossain SM, El-Sayed AM. Strengthening maternal and child health services in low-resource settings: Evidence from community health workers in Bangladesh. *BMC Public Health*. 2022; 22(1). Available from: [<https://bmcpublikealth.biomedcentral.com/track/pdf/10.1186/s12889-022-13448-7>](<https://bmcpublikealth.biomedcentral.com/track/pdf/10.1186/s12889-022-13448-7>)
- [2] Bhutta ZA, Soofi S, Cousens S, Mohammad S, Memon ZA, Ali I, et al. Improvement of perinatal and newborn care in rural Pakistan through community-based strategies: a cluster-randomised effectiveness trial. *Int J Infect Dis*. 2012; 16(12):e397–e405. Available from: [<https://www.sciencedirect.com/science/article/pii/S1201971212012209>](<https://www.sciencedirect.com/science/article/pii/S1201971212012209>)
- [3] World Health Organization. Women of reproductive age (15–49 years) population (thousands) \ [Internet]. WHO; \[cited 2025 Aug 5]. Available from: [[https://www.who.int/data/maternal-newborn-child-adolescent-ageing/indicator-explorer-new/mca/women-of-reproductive-age-\(15-49-years\)-population-\(thousands\)](https://www.who.int/data/maternal-newborn-child-adolescent-ageing/indicator-explorer-new/mca/women-of-reproductive-age-(15-49-years)-population-(thousands))]([https://www.who.int/data/maternal-newborn-child-adolescent-ageing/indicator-explorer-new/mca/women-of-reproductive-age-\(15-49-years\)-population-\(thousands\)](https://www.who.int/data/maternal-newborn-child-adolescent-ageing/indicator-explorer-new/mca/women-of-reproductive-age-(15-49-years)-population-(thousands)))
- [4] Global Advisory Group. Achieving the major disease control goals. *Wkly Epidemiol Rec*. 1994; 69:31.
- [5] Anastasi E, Borchert M, Campbell OM, Sondorp E, Kaducu F, Hill O, et al. Losing women along the path to safe motherhood: why is there such a gap between women's use of antenatal care and skilled birth attendance? A mixed methods study in northern Uganda. *BMC Pregnancy Childbirth*. 2015; 15(1):287.
- [6] Azad KAK. Tetanus—still a major health problem. *J Bangladesh Coll Phys Surg*. 2021; 39(3):152–3.
- [7] Blencowe H, Lawn JE, Vandelaer J, Roper M, Cousens S. Tetanus toxoid immunization to reduce mortality from neonatal tetanus. *Int J Epidemiol*. 2010; 39(suppl\ 1):i102–i109.
- [8] Ehsan A, Rahman MA, Kabir SM, Hasan M. Neonatal tetanus, yet not gone: infectious disease hospital experience. *J Enam Med Coll*. 2015; 5(3):161–5.
- [9] Mumtaz S, Bahk J, Khang YH. Current status and determinants of maternal healthcare utilization in Afghanistan: analysis from Afghanistan demographic and health survey 2015. *PLoS One*. 2019; 14(6):e0217827.
- [10] National Institute of Population Research and Training (NIPORT), Mitra and Associates, ICF International. Bangladesh Demographic and Health Survey 2017–18. *NIPORT*. 2020.
- [11] Sanogo NA, Yaya S. Wealth status, health insurance, and maternal health care utilization in Africa: evidence from Gabon. *Biomed Res Int*. 2020; 2020:4036830.
- [12] Sarkar PK. Expanded programme on immunization in Bangladesh: a success story. *Bangl J Child Health*. 2015; 39(2):93–8.
- [13] Sen B. *The health divide: analysis of inequality in health in Bangladesh*. Dhaka: Bangladesh Institute of Development Studies; 2001.

- [14] Talukdar L. \*The near miracle: how immunization services are delivered in Bangladesh\*. Dhaka: Dhaka University Press Limited; 1991.
- [15] Tauhid SA, Azad KAK, Morshed MN, Haque MA. Study of tetanus in the infectious diseases hospital, Dhaka, Bangladesh. \*\*J Bangladesh Coll Phys Surg\*\*. 2021; 39(3):160–6.
- [16] UNICEF. Maternal and newborn health. Newborns and mothers are still dying in appalling numbers – mostly from preventable causes \ [Internet]. 2021 \[cited 2025 Aug 5]. Available from:[<https://www.unicef.org/health/maternal-and-newborn-health>](<https://www.unicef.org/health/maternal-and-newborn-health>)
- [17] World Health Organization. Global polio eradication initiative: strategic plan 2004–2008 \[Internet]. Geneva: WHO; 2003. Available from: [<http://www.who.int/iris/handle/10665/42850>](<http://www.who.int/iris/handle/10665/42850>)
- [18] World Health Organization. Validation of maternal and neonatal tetanus elimination \[Internet]. Geneva: WHO; 2014. Available from: [[https://www.who.int/immunization/documents/MNTE\\\_Validation\\\_survey\\\_WHO\\\_IVB\\\_18.15.pdf](https://www.who.int/immunization/documents/MNTE\_Validation\_survey\_WHO\_IVB\_18.15.pdf)]([https://www.who.int/immunization/documents/MNTE\\\_Validation\\\_survey\\\_WHO\\\_IVB\\\_18.15.pdf](https://www.who.int/immunization/documents/MNTE\_Validation\_survey\_WHO\_IVB\_18.15.pdf))
- [19] World Health Organization. Protecting all against tetanus: guide to sustaining maternal and neonatal tetanus elimination (MNE) and broadening tetanus protection for all populations. Geneva: WHO; 2019.
- [20] Yaya S, Uthman OA, Amouzou A, Ekholuenetale M, Bishwajit G. Prevalence and predictors of taking tetanus toxoid vaccine in pregnancy: a cross-sectional study of 8,722 women in Sierra Leone. \*\*BMC Public Health\*\*. 2020; 20(1):1489.