Frequency rate of tetanus toxoid vaccination and associated factors among women attending well baby clinic at selected primary health care center in Cairo governorate

Thesis

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Marwa Magdy Mohamed Amer

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List of abbreviations

ANC	Ante Natal Care
BDHS	Bangladesh Demographic Health Survey
C tetani	Clostridium tetani
CNS	Central Nervous System
CS	Cesarean Section
DPT	Diphtheria Toxoid and ace Pertussis
DT	Diphtheria-Tetanus toxoid
EDHS	Egyptian Demographic Health Survey
EPI	Expanded Program of Immunization
GPS	Guillain-Barré syndrome
HCW	Health Care Workers
HE	Health Education
Hib	Haemophilus influenza type b
HIV	Human Immunodeficiency Virus
IPV	Inactivated Polio Vaccine
IU	International Unit
MNT	Maternal and Neonatal Tetanus
MOHP	Ministry Of Health and Population
NT	Neonatal Tetanus
PHC	Primary Health Care
SIAs	Supplementary Immunization Activities
Td	Tetanus-diphtheria
Tdap	Tetanus diphtheria acellular pertussis
TIG	Tetanus Immune Globulin
TT	Tetanus Toxoid
U.S.A	United States of America
UNFPA	United Nations Population Fund Agency
VAMP	Vesicle-Associated Membrane Protein
WHO	World Health Organization

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Abstract

Background: Tetanus is an acute fatal disease characterized by generalized rigidity and convulsive spasms of skeletal muscles. There is no natural immunity against tetanus; protection can be provided by active immunization with tetanus toxoid vaccine or administration of an anti-tetanus antibody. Maintaining maternal and neonatal elimination status in Egypt will require continued strengthening of routine tetanus toxoid immunization services that target pregnant women, routine immunization of children, clean delivery services in all districts and to identify the main reasons for bad performance.

Objective: To measure frequency rate of tetanus toxoid vaccination among women attending well baby clinic to vaccinate their infants or to follow up at El-Darb El-Ahmar PHC center at Cairo governorate and to identify different associated factors affecting this rate.

Subjects and methods: This study was a cross sectional study targeting (277) mothers at childbearing period attending the well baby clinic at El-Darb El-Ahmar PHC center. Mothers were interviewed to answer a questionnaire which included the socio-demographiccharacteristics of the woman, obstetric history, details of the last pregnancy and knowledge about maternal and neonatal tetanus disease.

Results: The results indicated that more than sixty percent of the studied mothers (60.6%) were vaccinated with at least one dose of tetanus toxoid vaccination and only (42.6%) of the studied mothers were fully protected against maternal and neonatal tetanus at their last birth.

Factors found to be associated with the rate of vaccination were: socioeconomic level, educational level, place of receiving ANC, receiving HE about TT vaccine, knowledge of women about NT disease and TT vaccine and the source of this knowledge**.**

Conclusion: The percentage of protection at last birth against MNT is low among women at child bearing period and certain interventions should be taken toward the modified factors to increase the tetanus toxoid coverage.

Keywords: tetanus toxoid, vaccination, women health.

Introduction

In many countries, deliveries take place in unhygienic circumstances, putting mothers and their newborn babies at risk for a variety of life-threatening infections. Maternal and neonatal tetanus (MNT) have been among the most common lethal consequences of unclean deliveries and umbilical cord care practices**(Pandian, 2011).**

Tetanus is an acute, often fatal, disease caused by an exotoxin produced by the bacterium Clostridium tetani *(C tetani)*. It is characterized by generalized rigidity and convulsive spasms of skeletal muscles. The muscle stiffness usually involves the jaw (lockjaw) and neck and then becomes generalized. The disease can affect any age group and case-fatality rates are high (10-80%) even where modern intensive care is available. There is no natural immunity against tetanus; protection can be provided by active immunization with tetanus toxoid (TT)-containing vaccine or administration of an anti-tetanus antibody**(WHO, 2010).**

Although tetanus vaccine has been available for years, neonatal tetanus (NT) still remains one of the major but preventable cause so f infant mortality in many developing countries **(Griffiths et al., 2004) and (Lambo and Nagulesapillai, 2012).** The disease has been virtually eliminated in the more industrialized nations through widespread childhood and maternal vaccination and improved conditions at delivery. Worldwide, th eWorld Health Organization (WHO) estimates that in 2010 (the latest year for which estimates are available), 58, 000 newborns died from NT, which shows 93% reduction from the situation

in the late 1980s **(Darko et al., 2012).** In the United States Reported tetanus cases have declined more than 95%, and deaths from tetanus have declined more than 99% since 1947 (the year when the disease became reportable nationally) (**Tiwari et al., 2011).**

The MNT Elimination Initiative aims to reduce MNT cases to such low levels that the disease is no longer a major public health problem. Unlike polio and smallpox, tetanus cannot be eradicated (as tetanus spores are present in the environment worldwide), but through immunization of pregnant women as well as other women of reproductive age and promotion of more hygienic deliveries as well as cord care practices, MNT can be eliminated (defined as less than one case of neonatal tetanus per 1000 live births in every district) **(WHO, 2015a).**

While progress continues to be made, by august 2015, twenty one countries have still not reached the MNT elimination status. Activities to achieve the goal are on-going in these countries, with many likely to achieve MNT elimination in the near future**(WHO, 2015a).**Successful control of NT hinges on both improved obstetric and postnatal care, and active immunization of women with tetanus toxoid (TT) before or during pregnancy**(Gubta and Keyl,1998).**A number of studies done in developing nations have demonstrated the efficacy of TT vaccination of pregnant women in decreasing deaths due to NT **(Roper et al., 2007) and (Blencowe et al., 2010).** The WHO guidelines for immunizing primarily non immunized or partially immunized women in developing countries recommend administration of five doses of TT during reproductive age to guarantee long-term immunity**(Maral et al., 2001).**

In Egypt in 2001, the Ministry of Health and Population together with its partner organizations initiated the Egyptian program to eliminate maternal and neonatal tetanus, building on the global initiative (led by WHO, UNICEF and UNFPA) to eliminate these diseases in every country. Between 2001 and 2006 a range of activities was undertaken to eliminate maternal and neonatal tetanus, supplementary immunization activities (SIAs) for tetanus toxoid (TT) were implemented in 68 selected high-risk districts. The target was more than 3 million women aged 15–49 years; more than 80% received 2 or more doses of TT **(WHO, 2007).**

In addition, improvements were made to the training of health staff at peripheral health units; social mobilization was strengthened; and surveillance was upgraded. The total number of reported cases of neonatal tetanus dropped from 194 in 2001 to 44 in 2006. In February 2007, the Ministry of Health and Population, in collaboration with WHO and UNICEF, carried out a community-based survey in a selected district in Beni Suef Governorate where children were considered to be at the highest risk from neonatal tetanus. This survey found that no deaths from neonatal tetanus occurred there throughout the year of 2006; this suggests that neonatal tetanus has been eliminated in this district so it is likely that the disease has also been eliminated in other districts in the country where infants are considered to be at a lower risk. Maintaining elimination status in Egypt will require continued strengthening of routine TT immunization services that target pregnant women**(WHO, 2007),** routine immunization of children, clean delivery services in all districts and to identify the main reasons for bad

performance, for example failure of women to return for subsequent doses, missed opportunities, limited outreach and lack of supplies**(UNICEF, 2000).**

These points signify the importance of the current study which was carried out to measure frequency of TT vaccination among mothers at child bearing period and to highlight the different associated factors affecting TT vaccination rate because there were not enough recent studies as far as we know discussing this issue in Egypt.

Aim of The Work

Goal:

To decrease neonatal and maternal mortality and morbidity caused by tetanus disease by strengthening the routine TT immunization services, also by finding out the factors associated with TT vaccination and consider it in order to maintain tetanus elimination status in Egypt.

Objectives:

To measure frequency rate of TT vaccination among women attending well baby clinic at El-Darb El- Ahmar PHC center at Cairo governorate and to identify different associated factors affecting this rate as socio-demographic characteristics of the women, obstetric history and knowledge about TT vaccine.

Chapter 1
Maternal and neonatal tetanus

Background:

Tetanus is an acute, often fatal, disease caused by an exotoxin produced by the bacterium Clostridium tetani *(C tetani)*. It is characterized by generalized rigidity and convulsive spasms of skeletal muscles. The muscle stiffness usually involves the jaw (lockjaw) and neck and then becomes generalized. The disease can affect any age group and case-fatality rates are high (10-80%) even where modern intensive care is available. There is no natural immunity against tetanus; protection can be provided by active immunization with tetanus toxoid (TT)-containing vaccine or administration of an anti-tetanus antibody***(WHO, 2010).***

History:

Although records from 5th century BC contain clinical descriptions of tetanus, it was Carle and Rattone in 1884 that first produced tetanus in animals by injecting them with pus from a fatal human tetanus case. During the same year, Nicolaier produced tetanus in animals by injecting them with samples of soil. In 1889, Kitasa to isolated the organism from a human victim and reported that the toxin could be neutralized by specific antibodies***(CDC, 2015).***

Pathophysiology:

Tetanus is a preventable disease caused by the neurotoxin produced by the bacterium *C tetani*, a gram positive obligate anaerobic spore-forming bacillus***(Darko et al., 2012***). The organism is widely distributed in soil and in

the gastrointestinal tracts of farm animals, dogs, rats, and approximately 10% of the human population. The spores produced by this bacterium can be found on skin surfaces and are particularly resistant to heat and antiseptic***(Darko et al., 2012***).The spores are extremely hardy; destruction requires autoclaving or prolonged exposure to iodine, hydrogen peroxide or formalin when introduced into necrotic wounds the spores may convert to toxin producing tetanus bacilli (***Roper et al., 2007)***.

Causative agent:

C. tetani produces two exotoxins: tetanolys in (which plays no role in the pathogenesis of the disease), and tetanospasmin (tetanus toxin) which is responsible for the clinical manifestations of the disease and isconsidered one of the most potent toxins ever identified, with a minimum lethal human dose of < 2.5 ng/kg ***(Darko et al., 2012*****).** This high potency is caused by the toxin's absolute neuro-specificity and enzymatic action ***(Bairwa et al., 2012)***.

Tetanus toxin is a zinc-dependent metalloproteinase that targets a protein (synaptobrevin/vesicle-associated membrane protein—VAMP) that is necessary for the release of neurotransmitter from nerve endings through fusion of synaptic vesicles with the neuronal plasma membrane. The initial symptom of local tetanus infection may therefore be flaccid paralysis, caused by interference with vesicular release of acetylcholine at the neuromuscular junction, as occurs with botulinum toxin. However, unlike botulinum toxin, tetanus toxin undergoes extensive retrograde transport in the axons of lower motor neurons and thus reaches the spinal cord or brainstem. Here, the toxin is transported across