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Research Article

Maternal and Neonatal Tetanus: A Case Study of Pakistan

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ABSTRACT:
Maternal & neonatal tetanus is an important and preventable cause of mortality globally. Pakistan has one of the highest maternal & neonatal mortality rates in the world, with widely prevalent maternal and neonatal tetanus. Reductions in deaths attributable to maternal & neonatal tetanus have been reported following increases in the coverage of tetanus toxoid immunization. The aim of the study was to determine the tetanus toxoid vaccination status of pregnant women, or women of child bearing age in districts of Faisalabad & Sargodha and to determine the factors associated with low coverage, if any. An observational study of descriptive type was conducted from January to June of 2013 in hospitals of Faisalabad & Sargodha. Our sample included 46 female subjects chosen following the principles of Probable Sampling of convenient type. In order to collect the required data, questionnaire forms and hospital records were used. 76% of subjects were aware of tetanus immunization technique during pregnancy & 72% of subjects were following the necessary immunization schedule. Lack of knowledge and negligence proved to be major contributors towards non-compliance with immunization schedule, with 50% & 31.25% contribution respectively. Efficient measures are needed to educate parents for better vaccination coverage. Effective media campaigns on maternal tetanus vaccination & mobilization of lady health workers are needed to increase the vaccination coverage. To achieve the 100% target of Tetanus Toxoid(TT) coverage, both short-term and long-term interventions are needed.

INTRODUCTION:

Neonatal tetanus is an acute disease presenting initially with loss of ability to suck, followed by generalized rigidity and painful muscle spasms as the disease progresses. The commonest port of entry for the tetanus spores is the unhealed umbilical cord. Most (90%) cases of neonatal tetanus develop symptoms during the first 3–14 days of life with the majority presenting at 6–8 days. Mortality tends to be very high: in the absence of medical treatment, case fatality approaches 100%; with hospital care 10–60% of NT cases die, depending on the availability of intensive care facilities. Clearly, prevention measures for tetanus are more effective than case management even if full intensive care were available, and certainly much more cost-effective. 1st Thus the primary focus of the neonatal tetanus elimination program is the immunization of women of childbearing age with tetanus toxoid.[1]

Tetanus is an acute, often fatal, disease caused by an exotoxin and highly potent neurotoxin, tetanospasmin, which is produced during the

growth of the anaerobic bacterium Clostridium tetani. Cl. tetani is not an invasive organism; infection with Cl. tetani remains localized. Tetanus spores are widespread in the environment. Tetanus bacilli can also enter the body through contaminated puncture wounds and sometimes seemingly trivial injuries. Once inside neurons, tetanus toxin cannot be neutralized by tetanus antitoxin. Toxin accumulates in the central nervous system, where it prevents the release of inhibitory neurotransmitters, such as glycine and gammaaminobutyric acid, thereby leaving excitatory nerve impulses unopposed. [2]

Pakistan has one of the highest maternal & neonatal mortality rates in the world, with widely prevalent maternal and neonatal tetanus (MNT). It is one of the 8 high-burden countries which account for about 73% of neonatal tetanus deaths. Pakistan is included in countries where more than 50% of the districts are at high risk for Maternal Neonatal Tetanus because of the limited health infrastructure. WHO estimated neonatal tetanus killed about 59,000 newborns in 2008 alone. In Pakistan, 28,882 cases were estimated and with some 21,619 estimated deaths. Estimated MNT mortality rate was 4.08 (per 1,000 live births).[3]

Neonatal tetanus can be prevented by immunizing women of childbearing age during pregnancy or outside of pregnancy. Prevention measures for tetanus are more effective than case management even if full intensive care were available, and certainly much more cost-effective. Thus the primary focus of the neonatal tetanus elimination program is the immunization of women of childbearing age with tetanus toxoid.

A trial in Papua New Guinea published in 1961 was the first demonstration that use of two or more doses of tetanus toxoid during pregnancy could prevent neonatal tetanus. In the mid-1970s, tetanus toxoid vaccination of pregnant women was included in the WHO's Expanded Program on Immunization. Immunization of pregnant women or women of childbearing age with two doses of tetanus toxoid was estimated to reduce mortality from neonatal tetanus by 94%.[4]

The tetanus vaccine is an inactivated toxin (toxoid) that was first produced in 1924. It became commercially available in 1938 and was successfully used extensively during the Second World War. In the late 1940s, it was combined with diphtheria and pertussis vaccines to produce the DTP triple vaccine used in many childhood immunization programmes. A trial in Papua New Guinea published in 1961 was the first demonstration that use of two or more doses of tetanus toxoid during pregnancy could prevent neonatal tetanus. In the mid-1970s, tetanus toxoid vaccination of pregnant women was included in the WHO's Expanded Program on Immunization. [5]

In neonates, tetanus occurs as a result of unhygienic birth practices, most commonly when tetanus spores contaminate the umbilical cord at the time that it is cut or dressed after delivery. Most neonatal deaths due to tetanus occur at home before the baby reaches two weeks of age with neither the birth nor the death being reported. The number of cases of tetanus reported also remains low, representing only the tip of the iceberg. [6]

Behaviours such as safe delivery practices, training of the traditional birth attendants (TBA) and immunization with tetanus toxoid (TT) are important factors affecting the incidence of tetanus. Immunization of pregnant women with TT induces the formation of antibody, primarily of the immunoglobulin G (IgG) class, which passes to the foetus through the placenta and prevents neonatal tetanus. Without that protection and if a birth takes place in unhygienic conditions, the newborn child may get tetanus through infection of the umbilical cord stump.[7]

Neonatal tetanus is an important preventable cause of neonatal mortality. Estimates from the year 2000 of the distribution of direct causes of death indicate that the infection accounts for 7% of neonatal deaths worldwide. Despite a considerable global mortality decline over the last two decades, continued high incidence in some countries results in a continued high burden of deaths, with an estimated 130,000 newborn deaths in the year 2004 from neonatal tetanus. Most of these deaths occur in a limited number of populous countries that have not yet managed to assure comprehensive health cover especially to rural

communities. Worldwide, tetanus kills an estimated 180,000 neonates (about 5% of all neonatal deaths (2002 data)) and up to 30 000 women (about 5% of all maternal deaths) each year. [8]

A recent systematic review yielded only one randomized controlled trial and one well-controlled cohort study. Immunization of pregnant women or women of childbearing age with two doses of tetanus toxoid was estimated to reduce mortality from neonatal tetanus by 94%. This systematic review also included the two studies listed in the Cochrane review ('Vaccines for women to prevent neonatal tetanus'), one from Columbia in 1966 and the second from Bangladesh in 1980.[9]

STANDARD IMMUNIZATION SCHEDULE:[10]

If the woman has not previously been vaccinated, or if her immunization status is unknown,
give two doses of TT/Td one month apart before delivery, and further doses as per table 1;
If the woman has had 1–4 doses of tetanus toxoid in the past, give one dose of TT/Td before
delivery (a total of five doses protects throughout the childbearing years).

Dose of TT or Td (acording to card or history)	When to give	Expected duration of protection
1	At first contact or as early as possible in pregnancy	None
2	At least 4 weeks after TT1	1-3 years
3	At least 6 months after TT2 or during subsequent pregnancy	At least 5 years
4	At least one year after TT3 or during subsequent pregnancy	At least 10 years
5	At least one year after TT4 or during subsequent pregnancy	For all childbearing age years & possibly longer

Table1: Tetanus toxoid immunization schedule for women of childbearing age & pregnant women without previous exposure to TT, Td or DTP

Neonatal tetanus and maternal tetanus is preventable via spreading awareness in the community and among health professionals about the tetanus immunization schedule in child bearing ages and during pregnancy and by adopting measures that will ensure an effective practice of tetanus immunization in these age groups. We can, therefore, prevent neonatal and maternal deaths due to tetanus and reduce health burden from the society.

OBJECTIVES:

- To assess the level of awareness in regards to tetanus vaccination during pregnancy among the community as well as medical personnel.
- To calculate the percentage of pregnant and parous ladies who actually follow the complete vaccination schedule.
- To determine the factors which are responsible for the failure of vaccination practice.

MATERIAL & METHODS:

SETTINGS: Obstetric wards and OPDs of Madina Teaching Hospital (MTH), Faisalabad and Maula Bakhsh Hospital, Sargodha.

SAMPLE SIZE: Our sample to be studied included 46 female subjects.

DURATION: Study was carried out from January to June of 2013.

SAMPLING TECHNIQUE: Sample was collected following the principles of "Probable Sampling: Convenient sampling".

INCLUSION CRITERIA:

- Pregnant females or Parous females
- If previous pregnancy is being documented, the female must have a good memory of the vaccination during the previous pregnancy.

EXCLUSION CRITERIA:

- Infertile females or Nulliparous females
- Females with valid history of psychological disorder

STUDY DESIGN: The study conducted was "observational study: descriptive type", in hospitals of Faisalabad & Sargodha.

DATA COLLECTION PROCEDURE: In order to collect the required data, questionnaire forms, interviews and hospital records were used.

ETHICS STATEMENT: This study used anonymised survey data made available for academic use, for which ethical approval was not required.

RESULTS:

- 76% of subjects were aware of tetanus immunization technique during pregnancy
- Health professionals from private sector were more efficient in providing the necessary information in this regards than government sector
- 72% of subjects with current pregnancies were following the necessary immunization schedule
- 93% of subjects were such who did not receive more than 2 doses of tetanus vaccine throughout their pregnancy
- 47% of the subjects claimed to have been vaccinated for their previous pregnancies
- Among the previous deliveries, 19% were conducted by untrained personnel & 44% were conducted in an unfavourable environment
- 70% of subjects had good family support in this regard
- Lack of knowledge & negligence proved to be major contributors towards non compliance with immunization schedule

Fig.No.1 Frequency Distribution according to Age out of a total of 46 subjects

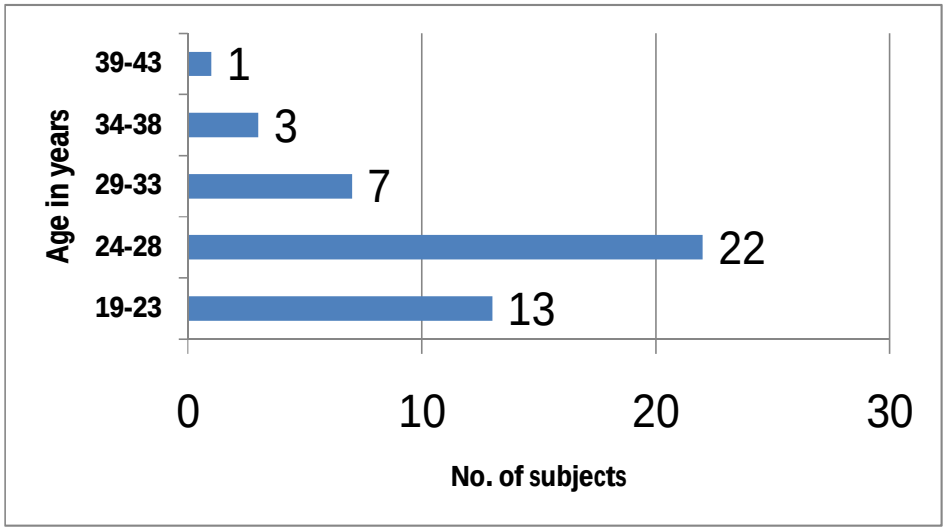


Fig.No.2 Residence: Rural v/s Urban out of a total of 46 subjects

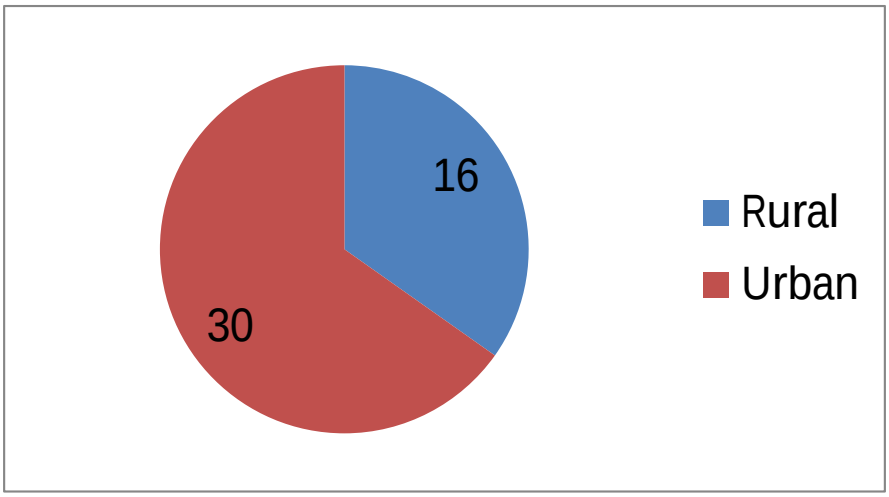


Fig.No.3 Literacy Level: Literate v/s Illiterate out of a total of 46 subjects

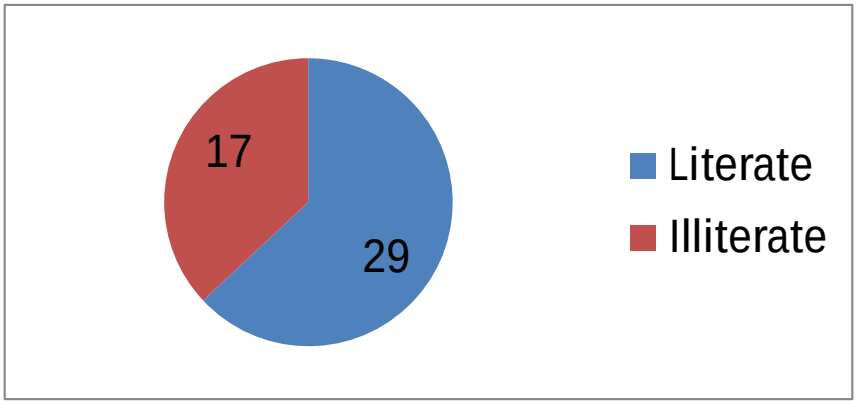


Fig.No.4 Primigravida v/s Multigravida out of a total of 46 subjects

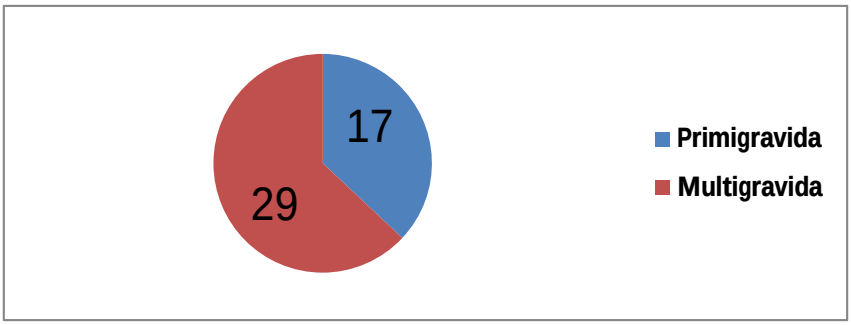


Fig.No.5 Level of Awareness about Tetanus Immunization during Pregnancy out of a total of 46 subjects

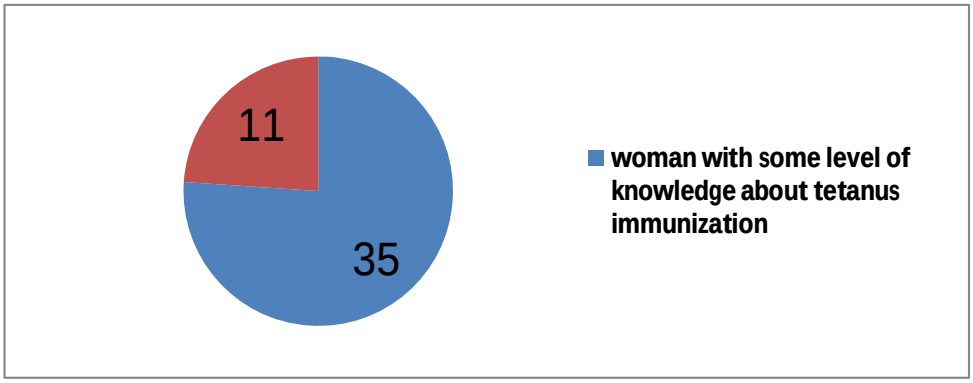
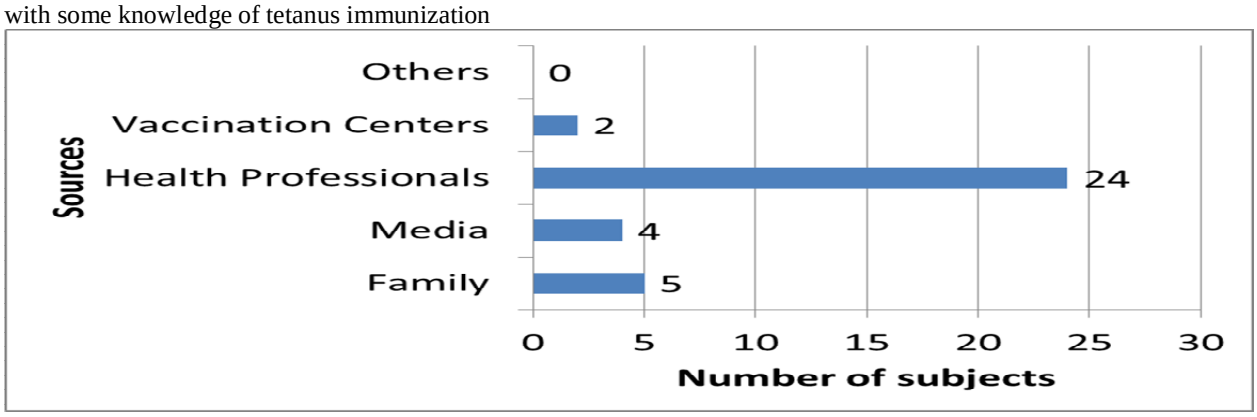


Fig.No.6 Source of Information among Subjects with some Knowledge of Tetanus Immunization out of 35 subjects with some knowledge of tetanus immunization



Did the concerned doctor provide the necessary information about tetanus immunization during pregnancy or not?

Fig.No.7 For Current Pregnancies out of 39 subjects with current pregnancy

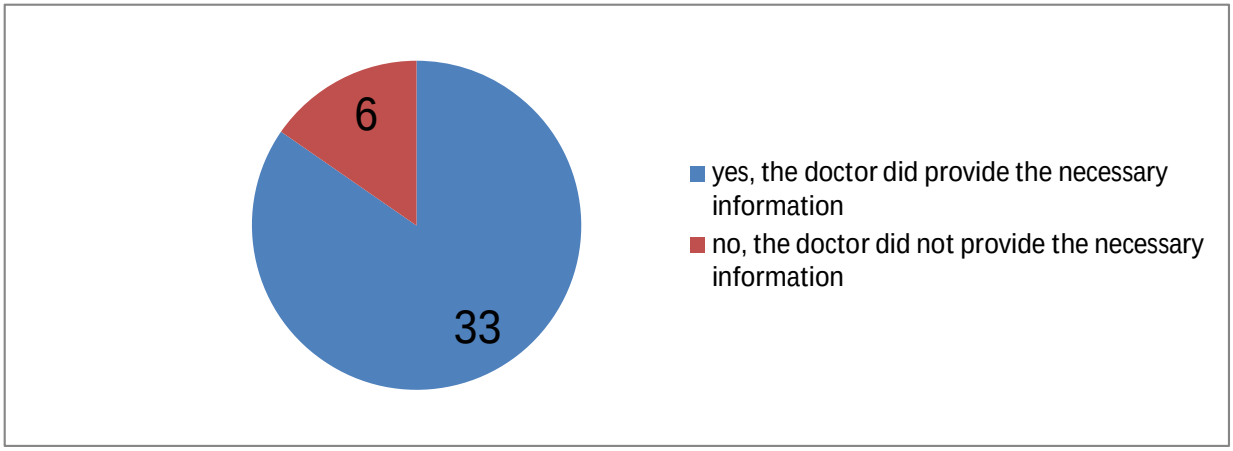


Fig.No.8 For Previous Pregnancies out of 32 subjects with previous pregnancies

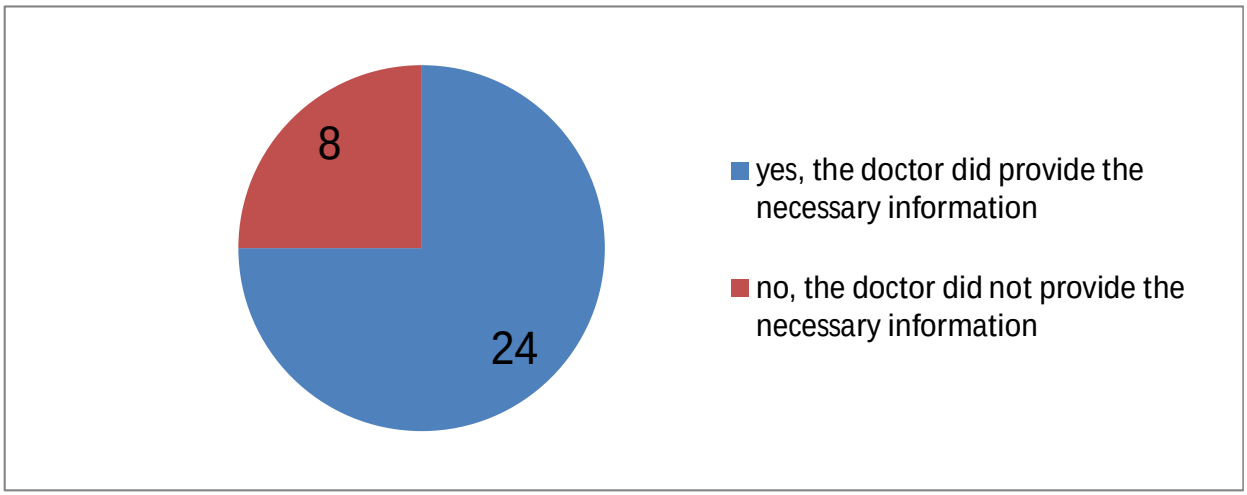


Fig.No.9 Number of Women who got Vaccinated against Tetanus during their Current Pregnancy out of 39 subjects with current pregnancy

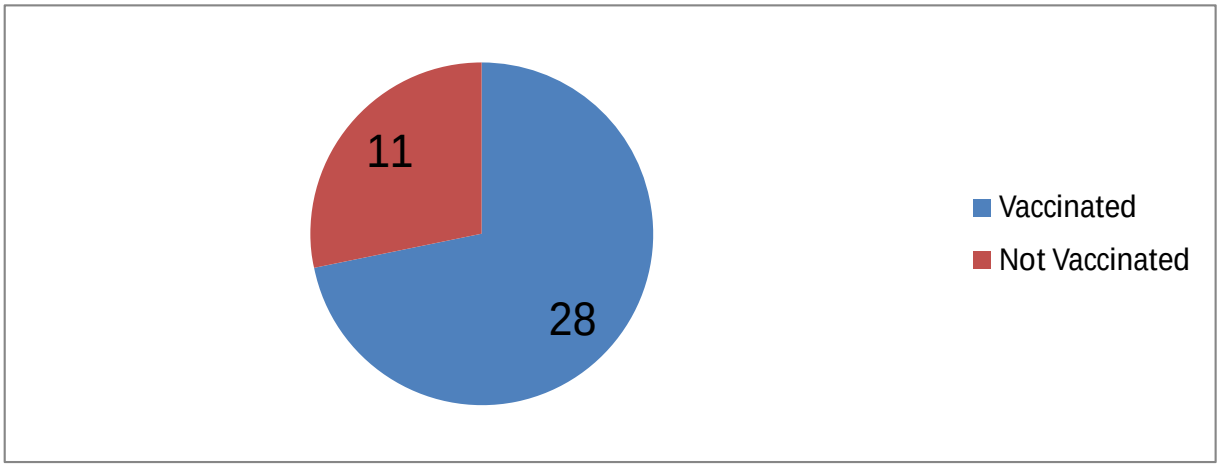


Fig.No.10 Frequency among Subjects with respect to the Number of Doses followed out of the Complete Vaccination Schedule
out of 28 subjects who had been vaccinated during their current pregnancy

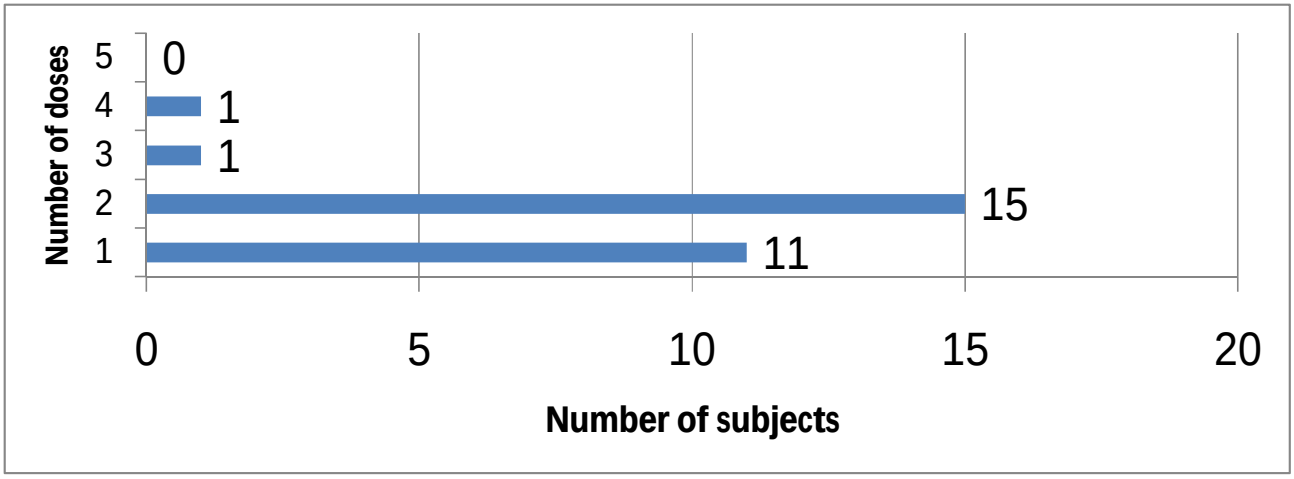


Fig.No.11 Number of Women who got Vaccinated against Tetanus during their Previous Pregnancies
out of 32 subjects with previous pregnancies

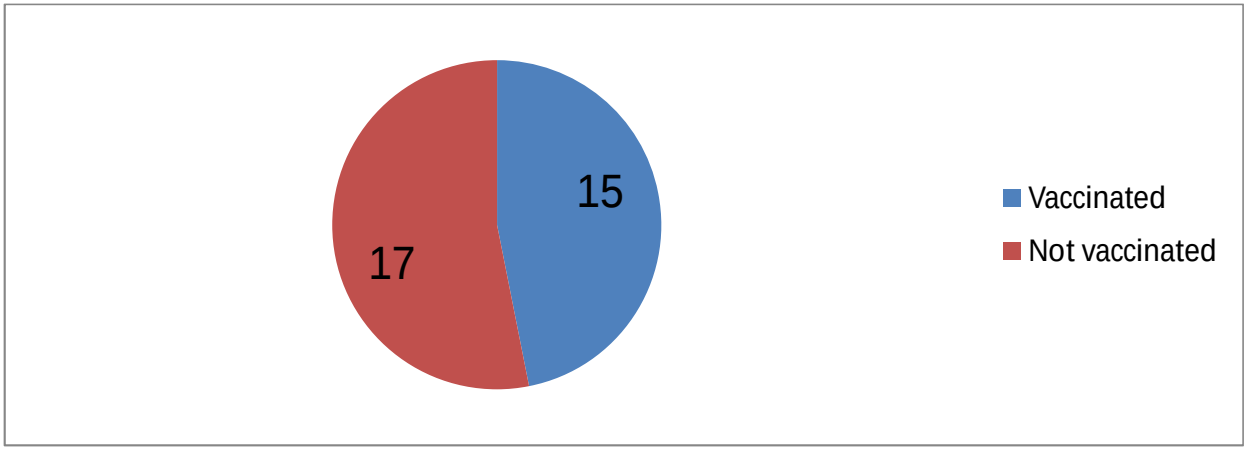


Fig.No.12 Was the Delivery at Home or at Hospital among Previous Pregnancies?
out of 32 subjects

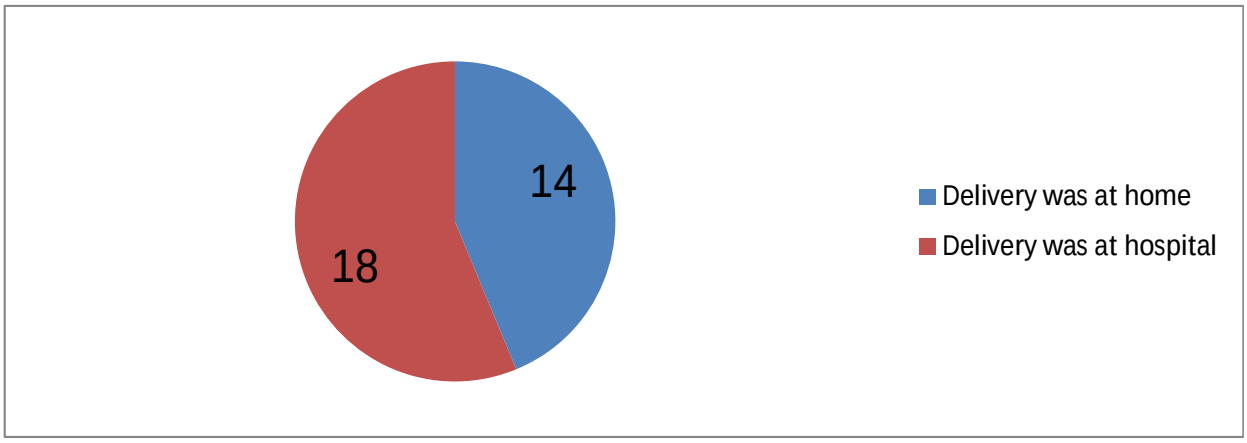


Fig.No.13 Were the Previous Deliveries conducted by a Trained or an Untrained Personnel?
out of 32 subjects

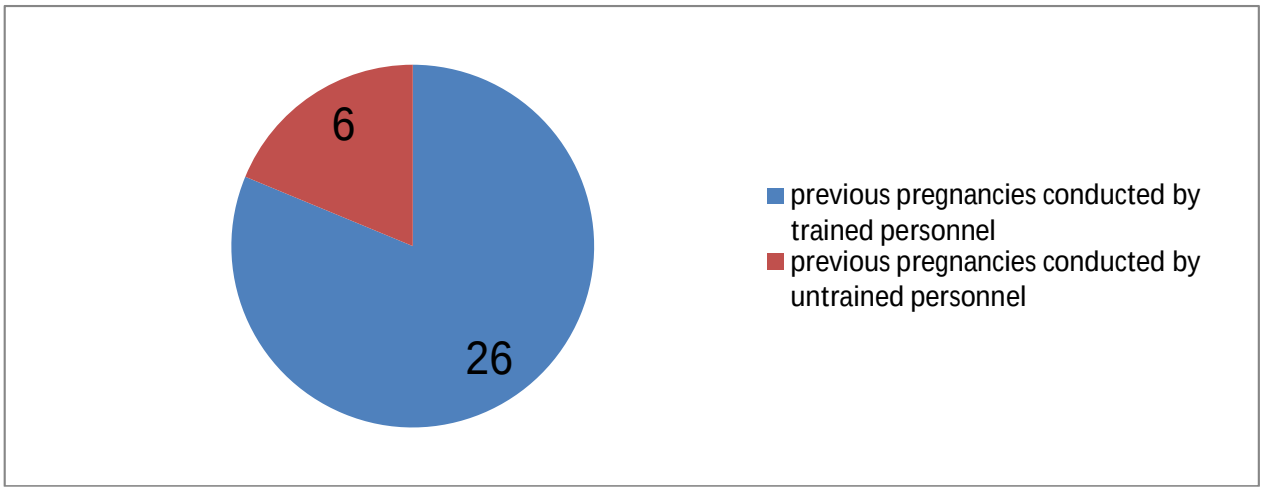


Fig.No.14 Sanitary Conditions during Previous Deliveries
out of 32 subjects

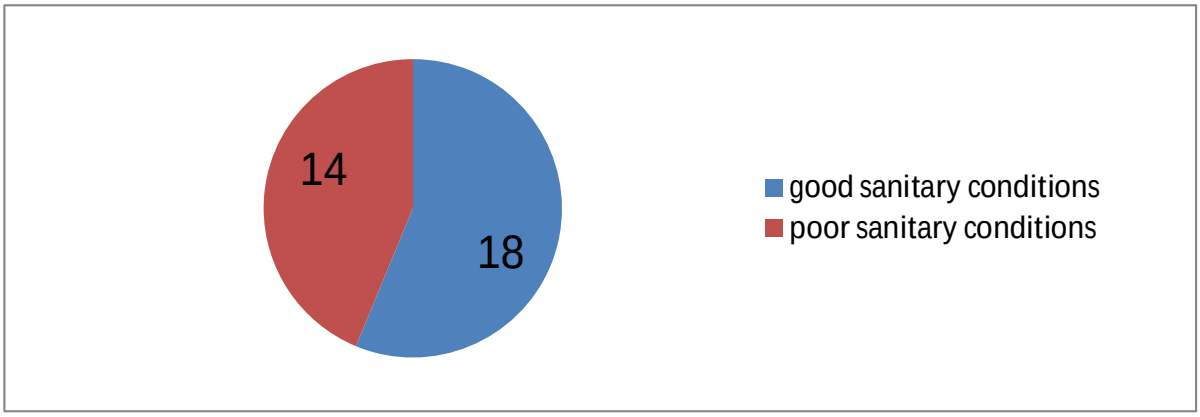


Fig.No.15 Attitude of Family in regards to Tetanus Immunization Practice during Pregnancy
out of 46 subjects

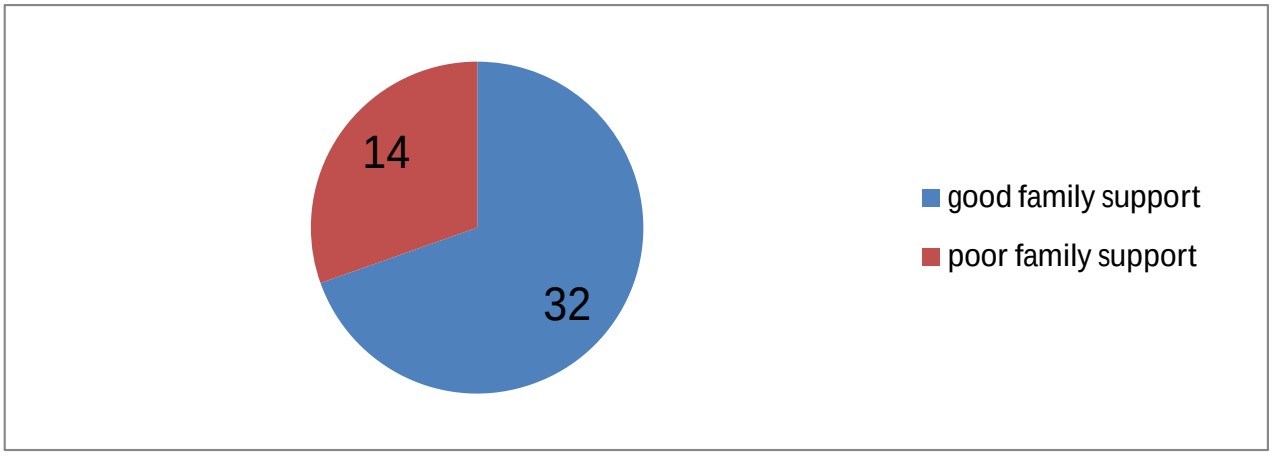


Fig.No.16 Frequency among Subjects with respect to various Causes for Non-Compliance of the Immunization Schedule
out of 16 subjects

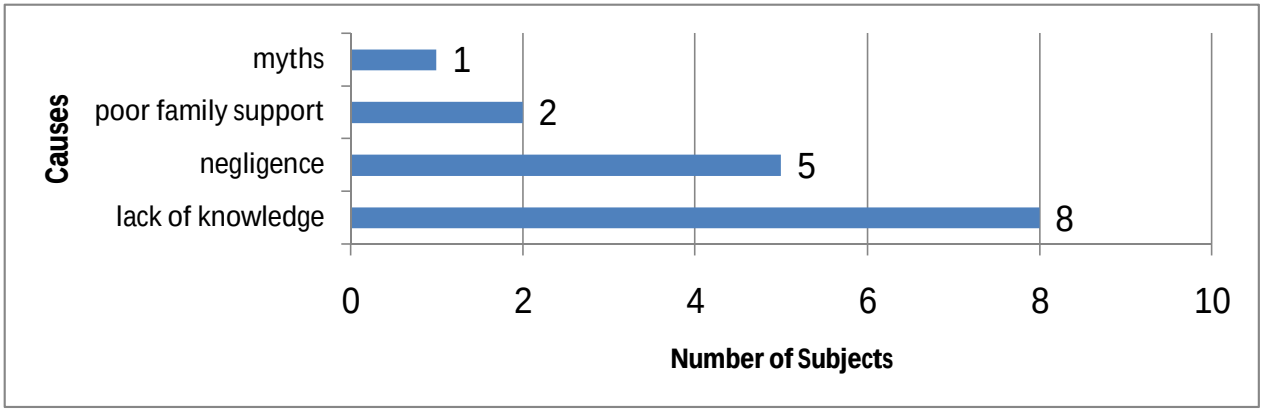
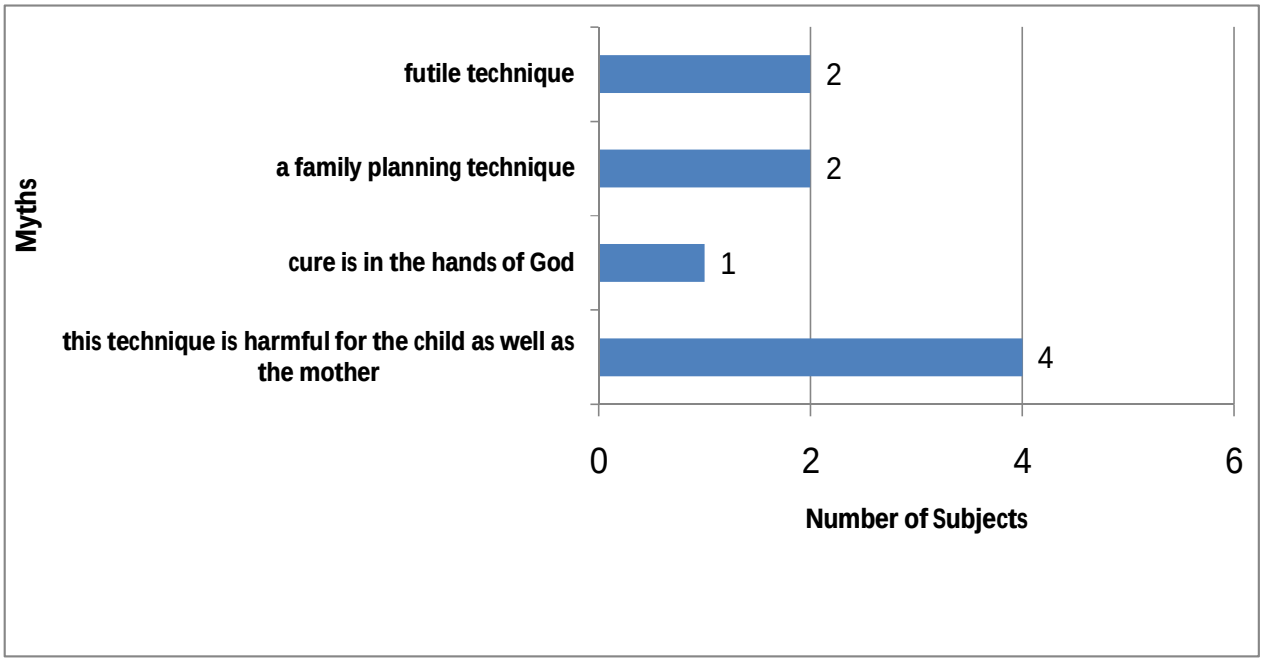


Fig.No.17 Frequency among Subjects with respect to various Myths about Immunization Practice
out of 9 subjects having some myth about tetanus immunization practice



DISCUSSION:

The tetanus toxoid coverage of mothers receiving both doses in our study was 72% which is better and satisfactory as compared to the statistics from other parts of the country. Reported overall routine vaccination coverage in Pakistan for Tetanus Toxoid(TT) was 50% in 2008 and 55% in 2009.[11] These statistics cover all the regions of Pakistan, from those with the highest TT coverage to those with the lowest. The overall percentage therefore is bound to be low. A baseline study done in four regions of Pakistan showed TT coverage of 48%. The causes of missing or low vaccination in this study are consistent with our study. Major reasons include mother being busy, laziness of parents, minor sickness of child, mother or both and lack of faith in immunization program. The short supply of vaccine in rural areas is also a major problem of improper vaccination. Other causes include forgetting scheduled dates by the parents, and self kind and baseless beliefs about immunization.[12] Reason

for low percentage in this study is the same as that mentioned for the above study. The information system of the Expanded Programme of Immunization (EPI) is reporting about 38% of the TT2 coverage of pregnant mothers in the province of Punjab. There is a variation in TT coverage even across the provinces of Pakistan. In a study conducted in District Peshawar, 65% of women in urban areas were vaccinated, while in rural areas 60% were vaccinated. While a study in Lahore district showed 87% coverage.

In a study conducted for Lahore District, out of a random sample of 362 women who had delivered during the previous 3 months, 87% recalled receiving 2 doses of TT. The main reasons for non-vaccination were poor knowledge about the importance of TT (32% of women) or the place and time to get vaccinated (18%). According to the managers and primary health care medical officers, the main reasons for low coverage were lack of awareness about the importance of vaccination among the public and misconceptions about TT vaccination (e.g. that it was a contraceptive). [13]

In another study from Lahore, tetanus toxoid coverage of mothers receiving both doses was 90.5% which is quite satisfactory. Reasons for not receiving tetanus toxoid vaccination include perception of useless vaccination, vaccination centers at distant places, socio-psychological reasons and harms to fetus.[14] In both the above mentioned studies for the district of Lahore, results were found to be quite favorable. This shows that maternal & neonatal tetanus elimination program in this area is quite effective & TT coverage is quite satisfactory. In another study conducted for Peshawar, the completed TT vaccination status was 55.6%. Urban population was 54.3% while rural population was 45.7%.

However, at least 78.0% had received one dose of TT vaccination. Immunization rate for maternal TT in Peshawar is much lower than other developed parts of the world and most similar cities of our country. Reasons for non-immunization were lack of awareness, low literacy, low accessibility and misconception regarding immunizations and associated with poor socioeconomic conditions.[15] Statistics from this region of Pakistan paint a horrible picture. This area is a neglected and unstable region of the country. Rigorous efforts are needed to be made to achieve an up to mark TT coverage in this area. Results of our study do not stand much in concordance with the results of these above mentioned studies. One reason is the regional differences in TT coverage; higher in developed cities of the country while lower in underdeveloped regions. Also our study was conducted on a limited number of subjects, a limited number of hospitals were covered and these were private sector hospitals.

CONCLUSION:

It is encouraging that 72% of the women interviewed were protected against tetanus. However, 28% of women remained unprotected against tetanus. The situation of TT2 coverage in other parts of the province is likely to be worse. Reasons for non-immunization were lack of awareness, low literacy, low accessibility, misconception regarding immunizations and associated with poor socioeconomic conditions, low women's empowerment, demotivated health workers and vacant posts of the vaccination staff. These issues have to be addressed, if any significant progress to maternal neonatal tetanus elimination is to be made. Efficient measures are needed to educate parents for better vaccination coverage. Effective media campaigns on maternal tetanus vaccination should be carried. Lady health workers should be mobilized effectively to increase the vaccination coverage. To achieve the 100% target of TT coverage, both short-term and long-term interventions are needed.

REFERENCES:

1-Chaudhary R., Mukehrjee A., Lahiri S.,A study on the knowledge of tetanus immunization among internees in a government medical

college of Kolkata. NJCM Vol.2 Issue 3 Oct-Dec 2011

2-Singh A., Maternal Tetanus Toxoid Vaccination and Neonatal Mortality in Rural North India. PLoS ONE 7(11) e48891 (9 November 2012)

3- Blencowe H., Lawn J., Vandelaer J., Roper M., Tetanus toxoid immunization to reduce mortality from neonatal tetanus Record, 2004, 79:292–297.

4- Validation of neonatal tetanus elimination in Andhra Pradesh, India. Weekly Epidemiological Record, 2004, 79:292–297

5- Maternal tetanus: magnitude, epidemiology and potential control measures. IJGO 1993, 40:3–12.

6- Maternal immunization against tetanus INTEGRATED MANAGEMENT OF PREGNANCY AND CHILDBIRTH (IMPAC) Standards for Maternal and Neonatal Care developed by the Department of Making Pregnancy Safer, World Health Organization.

7- Core information for the development of immunization policy. 2002 update. Geneva. World Health Organization, 2002 (document WHO/V&B/02.28), page 130.

8- Galazka AM. The immunological basis for immunization series. Module 3: tetanus. Geneva, World Health Organization, 1993 (WHO/EPI/GEN/93.13), page 17.

9- When should I take the tetanus injection during pregnancy? Available from URL http://doctor.ndtv.com, Accessed at 25-01-2013

10- Why and when is the Tetanus Toxoid (TT) vaccine given during pregnancy? Available from URL http://www.babycenter.com.

11-Immunization in Pakistan, PILDAT, briefing paper no.37, published on may 2oo7

12-Tarin, E., Khalil, M., Mustafa, T., Alvi, Z.M., Thomson, S.J., et al. (1999) Impact of community-based intervention on immunization coverage against vaccine preventable diseases in Pakistan. Pakistan Journal of Health. 36, 53-56.

13-To assess the causes of low tetanus toxoid (TT) vaccination coverage in pregnant women a mixture of quantitative and qualitative methods were adopted at the community, primary health care delivery and management levels in Lahore district, Pakistan.

14-Khurshid.f, Ahmad.T, Khalid.M, Islam.M, Vaccination Coverage of Mothers during Pregnancy with Tetanus Toxoid and Infants After Birth, Pak. J. Pharm. 24 (2) 35-39, 2011

15-Zia-Ul-Islam.K, Abbas.H, Khan.A, Coverage and factors associated with tetanus toxoid vaccination among married women of reproductive age: a cross sectional study in Peshawar Ayub Med Coll Abbottabad 2010;22(3) Available from URL http://www.ayubmed.edu.pk/JAMC/PAST/22-3/Naeem.pdf.