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Risk Factors and Complications Associated with Tuberculosis in Pregnancy and Neonates in Limpopo Province, South Africa

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ABSTRACT Basic Antenatal Care (BANC) was introduced in Primary Health Care (PHC) facilities in order to reduce the burden of consistently high maternal and neonatal mortality rate. The study identified risk factors and described complications associated with TB in pregnant mothers and neonates. A quantitative and descriptive research design was used to collect data at ten selected hospitals in Limpopo Province. Sample size of 150 Medical maternity case records was randomly selected. Records were assessed and analysed using checklist. The findings revealed socio-economic problems such as poverty and HIV/AIDS infections as the major risk factors associated with TB in pregnancy. Complications such as eclampsia and low birth weight in mothers and neonates were revealed. There is higher rate of HIV/AIDS infection among pregnant mothers with TB. Emphasis needs to be placed on strengthening the integration and implementation of PMTCT, TB/HIV in BANC services, and continue to build on past achievements.

INTRODUCTION

Tuberculosis (TB) remains an enormous burden disease affecting and killing both males and females. Indeed, TB is the greatest disease burden for mothers during their childbearing age of 15-44years (Arora and Gupta 2003; Connolly and Nunn 2013; Bekker 2015). The focus of this study is on mothers of child bearing age; namely, 15-44 years. However, individuals aged 15-19 years are teenagers who might be pregnant and infected with TB. WHO (2013) estimated 2.9 million new cases of TB in mothers and 530 000 in children. Mortality statistic was 410 000 and 74 000 from mothers and children respectively. Among the estimated mortality cases, majorities are in resource-limited countries or high-burden areas (Blinkoff 2009; WHO 2010, 2013; Connolly and Nunn 2013; Bekker 2015).

TB is the third cause of morbidity and mortality in mothers of reproductive age (Connolly and Nunn 2013; Crowley and Woolgar 2015). Mothers of childbearing age are among the new cases of TB and mothers who have died of TB; however, it was not documented in numerical terms. The majority of people infected with TB are in Asia and Africa where TB is endemic (WHO 2013). Studies related to TB affecting mothers of child-bearing age have been carried out in several places, such as England, Greece, Russia, Romania, Italy and Bangladesh. In Italy, the increase of TB cases is aggravated by increased immigration from Africa, Asia and Eastern Europe. Factors such as HIV/AIDS infection, poverty, homeless and drug abuse are associated with TB. These factors have an impact on the transmission of TB among mothers of child-bearing age (Laibl and Sheffield 2005; WHO 2012, 2013; Nkosi 2015). Findings of the study conducted in the London District General Hospital using 88 percent medical and maternity case records of immigrants mothers admitted with TB revealed that the majority started anti-TB treatments earlier. About 33 percent who delayed taking anti-TB treatments had miscarriages; five gave birth to small for date (low-birth weight of less than 2500g) and two premature deliveries (Kothari et al. 2006; Bekker 2015).

In Bangladesh, TB in pregnancy and child birth-related complications is the leading cause of maternal mortality and morbidity. Most mothers were exposed to complications such as hypertension, pre-eclampsia, eclampsia, premature rupture of membrane, malnutrition and placenta abruption. Poor nutritional status is also associated with increased maternal morbidity such as anaemia and hypo-proteinaemia (Liefooghe 2012). Quynh et al. (2000), Ormerod (2001), Siza (2008), and Loto and Awowole (2012) observed that TB is associated with obstetric complications such as spontaneous abortion, preterm labour, small for date uterus and low birth weight, and few cases of congenital TB in newborn babies. In addition, Diwan and Thorson (2001), Jana et al. (2009), Ratner et al. (2012), Margono et al. (2001) and Pollak and Potter (2004) found that

babies born from untreated pregnant mothers with TB are exposed to congenital TB, resulting in respiratory distress such as fever, poor feeding, lethargy, bleeding, schistosomiasis, anaemia, thromboembolic disease irritability and lymphadenopathy with an overall mortality of 38 percent. On the other hand, babies born from treated mothers had 22 percent overall mortality.

TB/HIV co-infection is an independent risk factor of maternal and neonatal mortality. Two studies conducted in Kenya revealed that pregnancy is a high risk factor of TB for mothers living with HIV/AIDS infection (Getahun et al. 2012; Conradie 2015). HIV weakens the immune system leading to increased vulnerability to infections, hastening progression of HIV to AIDS and influencing the risk of TB in pregnant mothers. TB/HIV co-infection tends to augment the progression of TB and worsens the immunosuppression of pregnant mothers, resulting into negative smear results leading to delay in diagnosing TB and commencement of anti-TB treatments (Mnyani and McIntyre 2011; Adhikari et al. 2011; Moorhouse 2015).

The findings of a study conducted at University Teaching Hospital, Lusaka, Zambia from 251 maternal deaths revealed that the majority of the infectious cases (145) of maternal deaths were due to TB 36 (25%); respiratory infections 32 (22%); HIV/AIDS 36 (25%) and malaria 43 (30%) (Khan et al. 2001). Another study conducted in Mozambique at a tertiary referral center from 171 maternal deaths revealed that 56 percent of the maternal deaths were mostly due to HIV/AIDS, TB, lung sepsis, meningitis and malaria (Menendez et al. 2008).

In South Africa (SA), 3 963 pregnant mothers in Soweto were enrolled and screened for TB. The findings revealed that from 1 454 (36.7%) who were HIV positive, TB was reported in 23.1 percent of these cases, and 13.8 percent of TB infections were from HIV sero-negative mothers. A two fold increase in obstetric morbidity such as prematurity, low birth weight and premature ruptures of membranes were also reported (Pillay et al. 2001). In Kwazulu Natal in 1990, 40 percent of pregnant mothers were infected with TB leading to maternal mortality and an increasing burden of TB in new-borns such as TB meningitis and TB in the blood (Milliary TB) (DoH Magazine of the Treatment Action Campaign 2008; Crowley and Woolgar 2015).

HIV/AIDS infection in pregnant mothers is the main risk factor which increases the risk of TB infection due to immuno-suppression (ANOVA Health Institute 2014; Conradie 2015). In Limpopo Province, ANOVA Health Institute reported that TB and HIV/AIDS are referred as twin epidemics. The initiation of PMTCT program since 2001 has also showed shortfalls in the implementation of PMTCT in district hospitals of Limpopo Province, resulting in maternal and neonatal morbidity and mortality (ANOVA Health Institute 2014; Bekker 2015; Mabitsi 2015). It is difficult to diagnose TB during pregnancy because of similarities and differences in TB and physiological changes due to pregnancy. This led to a delay in screening, diagnosis and commencement of anti-TB treatment during pregnancy.

Untreated TB leads to a number of series of complications such as placenta abruption, pre-eclampsia, premature labour, abortion, small for gestational age and congenital TB in neonates which were reported in Limpopo Province from pregnant mothers diagnosed with TB (Zaldivar-Munoz and Perez-Zaldivar 2010; ANOVA Health Institute 2014). However, the focus on TB is generally not prioritising mothers, as specified in the National Health Plan (ANC 2010; ANOVA Health Institute 2014). Particular attention is also not given to pregnant and breastfeeding mothers diagnosed with TB as there are limited document/reports which are presented nationally and provincially. Furthermore, literature search on Guidelines regarding prevention of complications of TB during pregnancy and puerperium do not reveal much evidence. Therefore, the purpose of the study was to describe the risk factors and complications associated with TB in pregnant mothers and neonates.

Objectives of the Study

The study identified risk factors and complications associated with TB in pregnant mothers, and further described complications associated with TB in both mothers and babies.

METHODOLOGY

Study Setting

The research study was conducted in a clinical setting at government hospitals in the five

districts of Limpopo Province of South Africa. Limpopo Province is the northernmost province of South Africa. Limpopo Province is divided into five municipal districts and subdivided into 25 local municipalities (Census 2012). The Department of Health and Social development in Limpopo Province consists of about 44 Hospitals, 27 Health Centres, and 408 Clinics, 1 Place of safety facility, 4 children's homes, 1 secure care facility and 1 176 crèches (DoH 2012-2016).

Research Design

A quantitative and descriptive research design was used to assess, identify and analyse risk factors and complications from medical maternity case records (Polit and Hungler 2006).

Population, Sample and Sampling

The population used in this study was all medical maternity case records for discharged pregnant and breastfeeding mothers of children younger than two years, who had been diagnosed with TB prior/during/after pregnancy, from 1 December 2012 to 31 May 2013. A sample size of 150 Medical maternity case records was randomly selected from 500 records at ten selected hospitals in Limpopo Province.

Data Collection and Instrument

An ethical clearance letter was obtained from the Higher Degrees Committee of University of Venda. Permission was also obtained from the Research Committee of the Department of Health and Social Development in Limpopo province and from the Chief Executive Managers of the hospitals. Mouton (2009) maintains that since scientific research is a type of human conduct, it follows that the research has to correspond with the generally accepted norms and values. Therefore, the researchers protected the rights of the institutions in which the study was conducted. The questionnaire as the checklist was used as an instrument for collecting data from medical maternity case records of discharged pregnant and breastfeeding mothers of children younger than two years, who had been diagnosed with TB prior/during/after pregnancy. Structured questions relating detailed information about the demographic profile, presentation at ANC, risk factors, maternal and neonatal complications associated with maternal TB, were formulated.

Pretesting was conducted using fifteen medical maternity case records in order to determine the validity and reliability of the instrument prior to the main study (Crookes and Davies 2004; Polite and Beck 2008; Burns and Groove 2009). Analysed records and the hospitals where pretesting was done did not form part of the main study. Medical maternity case records of discharged pregnant and breastfeeding mothers were retrieved, assessed and analysed using a checklist. Internal hospital protocols or policies for each hospital were observed and adhered to as medical records are legal documents of patients.

Data Analysis

All completed questionnaires using checklists were coded into the computer and analysed using the Statistical Package of Social Sciences (SPSS) v 22.0 software to establish frequencies and percentages. The purpose of data analysis was to impose some order on a large body of knowledge. In-depth discussion of the collected data was done and a general conclusion was communicated in a research report. Statistical procedures enabled the researcher to reduce, summarise, organise, evaluate, interpret and communicate numerical information (Polite and Hungler 2006).

RESULTS

Medical maternity case records were assessed and analysed. The risk factors associated with TB in pregnancy, maternal and neonatal complications were identified. The findings of the study are presented in two tables. Table 1 presented demographic profile and obstetric information. The findings from medical maternity case record revealed significant factors which might affect the quality of life in women of child bearing age. Majority of the women (83.3%) are thus likely to be vulnerable to HIV infection due to multiple partners (Stewart et al. 2007). Most mothers diagnosed with TB (97.3%) were unemployed. Obstetric information showed that many (85%) pregnant mothers presented themselves late at ANC care service centers, which is during the second and third three months of pregnancy. Findings further revealed that most pregnant mothers (92.7%) had not undergone TB screening during their first visit to ANC in contraven-

tion of WHO's recommendations (Odendal 2013). The latter had resulted into late commencement of anti-TB treatments. The findings affirmed also uncovered that majority many mothers (85.3%) commenced or initiated their anti-TB treatments during breastfeeding period.

Table 1: Demographic profile and obstetric information

Demographic variables	*Frequency*	*Percent*
1. Marital Status		
Single	125	83.3
Married	24	16.0
Divorced	1	0.7
Widow	0	0
Total	150	100.0
2. Employment History		
Unemployed	146	97.3
Self employed	3	2.0
Permanently employed	1	.7
Total	150	100.0
3. Parity		
0-2	81	54.0
3-4	58	38.7
e>5	11	7.3
Total	150	100.0
4. Common Causes of Deaths in Children		
Respiratory infection	25	16.6
Diarrhoea and vomiting	1	0.6
Prematurity	19	12.6
Not known	4	2.6
Total	49	32.6
Missing	101	67.3
Total	150	100.0
5. First Presentation at ANC		
First three months	11	7.3
Second three months	41	27.3
Third three months	88	58.7
Unbooked cases	10	6.7
Total	150	100.0
6. Previously Treated for TB		
Yes	43	28.7
No	107	71.3
Total	150	100.0
7. Screening for TB Done During First Visit		
Yes	11	7.3
No	139	92.7
Total	150	100.0
8. Period of Commencement of Anti-TB Treatment		
First three months	1	0.7
Second three months	11	7.3
Third three months	10	6.7
After delivery of the baby	128	85.3
Total	150	100.0

Table 2 presented risk factors and complications associated with maternal TB. The findings from medical maternity case records came out with significant risk factors and complications associated with maternal TB. The findings revealed that 47.3 percent mothers who were living with HIV/AIDS were more likely to develop active TB. The findings also revealed that majority of mothers 92.7 percent had history of chronic cough for more than two weeks and 84.7 percent of mothers had lost weight or were malnourished. Chronic cough and loss of weight are symptoms of TB. Findings further revealed maternal and neonatal complications. More than

Table 2: Risk factors and complications associated with maternal TB

Demographic variables	*Frequency*	*Percent*
9. History of Chronic Illness to the Mother Diabetes mellitus	*1*	*0.7*
Hypertension	9	6.0
Cancer	1	0.7
HIV/AIDS	71	47.3
Other, specify	9	6.0
None	59	39.3
Total	150	100.0
10. History of Chronic Cough Lasting More Than Two Weeks		
Yes	139	92.7
No	10	6.7
Total	149	99.3
Missing	1	0.7
Total	150	100.0
11. Weight Loss or Malnutrition		
Yes	127	84.7
No	23	15.3
Total	150	100.0
12. Birth Weight of the Baby		
Less than1999g	41	27.3
2000g-2499g	36	24.0
e" 2500g	70	46.7
Not recorded	3	2.0
Total	150	100.0
13. Complications for the Mother		
Pre-eclampsia	5	3.3
Premature rupture of membranes	22	14.7
Abortion	5	3.3
Placenta abruption	4	2.7
Placenta praevia	3	2.0
MDR/XMDR	20	13.3
Other, specify, TB relapse	21	14.0
None	70	46.7
Total	150	100.0
14. Complications for the Baby		
Anaemia	3	2.0
Fetal growth retardation	1	0.7
Low birth weight	41	27.3
Small for gestational age	35	23.3
Persistent respiratory infections Treated for TB	155	10.03.3
Other, specify	2	1.3
Total	102	68.0
None	48	32.0
Total	150	100.0
15. Isoniased Preventive Therapy (IPT) Given to the Baby		
Yes	104	69.3
No	46	30.7
Total	150	100.0

half 53.3 percent of mothers diagnosed of TB had complications associated with maternal TB. More than half 51.3 percent of the babies born from mothers diagnosed of TB were of low birth weight of less than 2500g. Majority of babies 68 percent had neonatal complications associated with maternal TB.

Findings further showed that majority of babies 69.3 percent who were born from mothers with active TB were given Isoniased Preventive Therapy (IPT) for the first three months of birth.

DISCUSSION

Untreated maternal TB or delay in the administration of anti-TB treatment leads to increased maternal and neonatal mortality (Turnbull et al. 2012). The following are associated with the risk factors and complications of TB in pregnancy.

Risk Factors Associated with Maternal TB

Solarin and Black (2013) report that maternal morbidity rate are high at 410 per 100 000 live birth in South Africa. Contributory factors are many but HIV is a significant risk contributor. Mothers who are HIV positive are vulnerable to TB due to suppression of their immune system and they may not be diagnosed during pregnancy due to their negative smear (Loto and Awowole 2012; Bekker 2015). This might lead to late diagnosis and commencement of anti-TB treatment, causing complications to both mother and baby. The findings in this study revealed the following as risk factors associated with TB in pregnancy:

➢ Unemployment	97.3%
➢ Malnutrition	84.7%
➢ Late presentation at ANC	85.0%
➢ Delay in screening for TB during pregnancy	92.7%
➢ Sputum smear done after delivery	68.0%
➢ Chest x-ray done after delivery	74.1%
➢ Commencement of anti-TB drugs (after delivery)	85.3%
➢ TB relapse	28.7%

Risk factors identified in this study significantly expose pregnant mothers and neonates to be at high risk of TB. The risk factors were clustered and discussed under two sub-headings below.

Delay in Screening and Diagnosis of TB

Prevention of Mother to Child Transmission (PMTCT) Guidelines recommended that HIV Counseling and Testing (HCT) should be carried out on all mothers presenting at ANC. This is followed by TB screening to pregnant mothers attending ANC care services. Globally, findings to fight AIDS, TB and Malaria in 2002 have rapidly scaled up HCT as an entry point to treatment and care. This is done to assist in the achievement of Millennium Development Goals (MDG) 4, 5 and 6 by 2015 (Van Schalkwyk et al. 2013; Moorhouse 2015). However, screening for TB is not done for all pregnant mothers at ANC clinic.

In this study, no proof of TB screening was found in the retrieved medical maternity case records unless these were filled at the clinic. The findings from Medical maternity case records affirmed that the majority (92.7%) of pregnant mothers were delayed inTB screening during pregnancy. This is a significant factor associated with the late diagnosis of TB during pregnancy. This could have resulted in complications of TB to both mother and baby. These findings further affirmed that screening was not done during the pregnant women's first visit to the ANC, despite the WHO recommendations of integrating TB/HIV screening at ANC care services. In addition, there was a problem of delay in the availability of the results for the few mothers who were screened for TB which might have led to a delay in the initiation of anti-TB treatment.

Secondly, the majority of the pregnant mothers (68.0%) had a sputum smear to diagnose for TB after delivery and 74.1 percent had a chest x-ray after delivery. This is problematic because these actions could have contributed to neonatal and maternal complications, identified from those medical maternity case records. This could be because chest x-ray is contra-indicated during pregnancy or before six months of pregnancy has elapsed, in order to prevent radiation exposure to the fetus (Odendal 2013). However, chest x-rays may assist in screening for TB in addition to symptom screening and it should be used with caution on pregnant mothers. Effective protective measures need to be provided in cases where it is deemed important for chest x-ray to be done (Odendal 2013; Bekker 2015). In this study, there were no reasons specified for

failing to do chest x-ray during the third trimester of pregnancy as it was no longer harmful to the baby.

WHO (2010) recommended that pregnant mothers need to be asked about symptoms related to TB, such as cough, night sweat and loss of weight at their first visit to Maternal and Child Health (MCH) services and at every other visit or repeated at 32-36 weeks of pregnancy to health care services. This is because TB can develop at any time during their pregnancy. Presenting symptoms such as weight loss (84.7%) and history of chronic cough (92.7%) for more than two weeks as significant factors of TB during pregnancy might have not been recognised. In addition, diagnosing TB in pregnancy is problematic, as pregnant mothers tend to be asymptomatic. Also, weight loss might not be noticeable because of weight gain due to the pregnancy itself, shortness of breath and tiredness which might be associated with advanced pregnancy and mostly if coupled with HIV infection (Thapa et al. 2010; Moorhouse 2015). Similarly, Odendal (2013) and Snyman et al. (2015) reported that weight loss might not be noticed earlier, but pregnant mothers with TB are more likely to report weight loss during the last two months of the most recent pregnancy. This might be associated with anxiety and worries about pregnancy outcome and TB.

BANC, TB and HIV programs need to be integrated into MCH services at PHC facility level in order to improve the health outcome for both mothers and neonates. Therefore, BANC and PMTCT programs are an important first contact for health care services for pregnant mothers. Hence, MCH care services provide an excellent opportunity to detect and treat TB in pregnant mothers and their neonates (DoH 2010, 2014; Crowley and Woolgar 2015). Timely diagnosis and treatment of maternal TB is important in order to reduce morbidity and mortality for both mother and baby.

Commencement of and Compliance to TB treatment

Anti-TB treatment commences following the positive sputum results. The pregnant mother is referred to a TB coordinator or TB focal point for registration and commencement of anti-TB treatment for a period of six-eight months. Treatment should be given seven times a week under the supervision of DOTs, presently Home-based cares or may be a clinic staff or teacher (DoH 2012-2016). However, this is problematic in a situation where mothers do not want to disclose their condition because people link TB with HIV/AIDS.

The findings of this study affirmed that the majority of mothers (85.3%) commenced or initiated their anti-TB treatments during the breastfeeding period, and that might be associated with late presentation at ANC care services, and a delay in TB screening during their first visit. This is a significant factor, exposing both mother and baby to a high risk of TB complications. Among the 22 mothers who were screened during the first three months of pregnancy, delay might be associated with a smear-negative pulmonary TB, which is common in HIV-infected pregnant mothers or may be delay in the availability of results. TB/HIV co-infected mothers tend to produce fewer bacilli and sputum smear has limitations for diagnosing this form of TB (Odendal 2013).

Poor treatment compliance might be associated with lack of counseling and knowledge concerning benefits of treatment compliance, stigma attached to TB, cultural beliefs, religious practices, side effects such as nausea, vomiting and a poor relationship with health providers/relatives/husband/home-based cares, leading to maternal and neonatal complications (Centres for Disease Control and Prevention 2013). Loto and Awowole (2012) wrote that poor treatment adherence is associated with overlapping side effects of anti-TB treatments and ARVs if a mother is on double treatment. Mothers who are taking two different treatments for two conditions such as HIV/AIDS and TB, or chronic diseases like hypertension, may start skipping treatments until they default. That would put them at high risk of maternal and neonatal complications such as low birth weight babies, TB relapse and abortion.

In addition, the findings revealed that 43(28.7%) of the mothers were previously treated for TB. This might imply that 43 mothers had TB relapse which might had been caused by a variety of factors, such as poor compliance to anti-TB treatment (the most common reason), drug resistance, mal-absorption of drugs, laboratory error, and extreme biological variation in response. DoH (2012-1016) noted that a relapse may occur after completion of therapy, where the patient had shown improvement or may occur as a result of treatment failure.

Continued payment of a grant and receiving food parcels also play a major role in treatment compliance. Mabunda et al. (2012) reported similar findings that treatment compliance is high where patients diagnosed with TB receive some food parcels or grants. Good treatment compliance promotes the quality of life to both the mother and baby, thus preventing TB complications. Sometimes mothers are worried that the grant will be discontinued. Therefore, these women choose to remain sick, as shown through a positive sputum smear, exchange sputum for grant to continue, putting both mother and baby at high risk of complications.Early and adequate treatment of TB during pregnancy, birth, puerperium and breastfeeding period do not presuppose any risk of TB relapse.

In addition, mothers from poor socio-economic status, unemployed, poor maternal nutritional status, minorities and mothers with risk factors such as HIV are at high risk of maternal and neonatal complications (Turnbull et al. 2012; Nkosi 2015). Therefore, TB might worsen and aggravate poor maternal condition. These findings affirmed that HIV is a significant factor contributing to progression from TB infection to full-blown TB. Odendal (2013) suggests that pregnant mothers and breastfeeding mothers living with HIV for six months are more likely to develop active TB.

Other risk factors contributing to the development of TB among pregnant mothers include living in an area where TB is endemic, close contact with a person with active TB or being immuno-suppressed due to HIV infection or treatment with immuno-suppressive medication. HIV infections suppress the immune system among pregnant mothers and increase their risk of developing active TB. Thus, HIV/TB co-infection further increases the risk of death from TB to both mother and baby or transmission of TB or HIV to the babies. Therefore, pregnant mothers living with HIV/TB co-infection are three times more likely to die than mothers who only have TB and not HIV (Loto and Awowole 2012; Conradie 2015).

Maternal Complications

Maternal morbidity and mortality has increased by 20 percent during the 2005-2007 periods (Loto and Awowole 2012). Late presentation at ANC leads to late diagnosis and treatment of TB which contributes to poor maternal health, leading to complications. TB in pregnant mothers can cause significant maternal morbidity. The findings from medical maternity case records revealed the following maternal complications:

➢ Pre-eclampsia	3.3%
➢ Premature rupture of membranes	4.7%
➢ Abortion	3.3%
➢ Placenta abruption	2.7%
➢ Placenta praevia	2.0%
➢ MDR/XMDR	13.3%
➢ Other complications including TB relapse and Anaemia	14.0%

The majority of the mothers (53.3%) had developed a variety of complications, as reported in the medical maternity case record. This might be associated with a delay in seeking ANC, screening, diagnosis and commencement of anti-TB treatments. MDR/XMDR might be associated with poor treatment or treatment failure. Turnbull et al. (2012) and Grounder et al. (2012) also reported similar findings that untreated maternal TB can lead to maternal morbidity through high rate of abortion, post-partum haemorrhage, pre-eclampsia and difficulty in labour. Similar reports were made by the DoH (2010) and Snyman et al. (2015) that a late diagnosis of TB in pregnant mothers is associated with increased obstetric morbidity such as premature rupture of membranes; placenta abruption; MDR/XMDR and TB relapse, particularly with Pulmonary TB. Therefore, a good pregnancy outcome can be achieved with early diagnosis and administration of appropriate anti-TB treatment (Bekker 2015).

Neonatal Complications

Centres for Disease Control and Prevention (2013) wrote that if TB is not treated during pregnancy, there is an increased risk to the unborn baby. The baby may be born with a lower birth weight than those born to mothers without TB or treated early for TB. The following neonatal complications were identified from medical maternity case record:

➢ Anaemia	2.0%
➢ Fetal growth retardation	0.7%
➢ Low birth weight	27.3%
➢ Small for gestational age	23.3%
➢ Respiratory distress	10.0%
➢ Treated for TB	3.3%
➢ Other complications	1.3%

These findings might imply that 68 percent of babies developed complications related to maternal TB. A little over half of the babies (51.3%) had a birth weight of less than 2500g, which might be associated with TB. The normal average birth weight of the baby is 2500 gram and above (Kidspot 2013). Similar findings were reported; that untreated TB among pregnant mothers increases the risk of prematurity and a low birth weight. A baby may be infected with TB before he/she is born and after birth, and develop active TB and is associated with an increase in perinatal deaths (Odendal 2012). The findings further revealed 9(6.0%) of neonatal deaths, implying that most of the babies who had complications associated with TB survive. In utero, the fetus may swallow the infected amniotic fluid or the infection may be spread through the blood in the umbilical cord. Persistent respiratory distress might be associated with TB infection due to a weak immune system of the new-born from the infected mother with active TB.

It is further noted that 69.3 percent of babies were given prophylaxis preventive treatment (Isoniased). This might imply that the majority of babies were born from mothers with active maternal TB, though most of the mothers were missed during pregnancy, diagnosed and started anti-TB treatment after delivery. Odendal (2012) and Crowley and Woolgar (2015) noted that the diagnosis of TB in a new-born may be very problematic as there are often no obvious symptoms of the disease. The infant born from mothers with active TB may show up symptoms during the second or third week of life. Thereafter, a rapid diagnostic test, such as culture test for TB must be conducted from the tissues or fluids of the infant. Full TB treatment must be given to the infant with active TB. In case there is no evidence of active TB, prophylaxis of Isoniazid Preventive Therapy (IPT/INH) 10 mg/kg/daily for six months should be given to the infant.

Turnbull et al. (2012) reported similar findings that early diagnosis and appropriate treatment of TB can lead to achievement of good neonatal outcome, and failure results in fetal growth, retardation, low birth weight, anaemia and chest infections. Loto and Awowole (2012) reported that congenital TB may occur as a result of aspiration of infected amniotic fluid, but is rare and difficult to distinguish from other neonatal or congenital infections with similar symptoms.

CONCLUSION

Untreated, late screening and late diagnosis of maternal TB and late commencement of anti-TB treatments are associated with maternal and neonatal complications. The findings in this study identified several risk factors associated with maternal TB. These are HIV as the significant risk factor contributing to progression from TB infection to TB disease; delay in screening for TB during first visit at ANC or at 32-36 weeks of pregnancy, a variety of maternal and neonatal complications among the 150 medical maternity records which were assessed and analysed. These may retard the progress towards the country's attaining the United Nations' MDG 4, 5 and 6 (a global plan to reduce TB prevalence by 50% by 2015 and elimination of TB by 2050). BANC, TB/HIV and PMTCT programs need to be integrated into MCH care services at PHC facilities in order to improve the health outcomes for both mothers and infants. In addition, BANC needs to be emphasised as an important first contact to health services for pregnant mothers.

RECOMMENDATIONS

On the basis of the findings from this study, the following came out as the recommendations:

- Guidelines related to prevention of complications of TB during pregnancy and puerperium should be developed and implemented from grassroots level (PHC) to meet the MDG 4, 5 and 6 by 2015.
- Education and support for mothers diagnosed with TB taking treatment should be conducted continuously, including among family members, friends, neighbours and the community as a whole.
- New research studies need to be initiated to identify various techniques which need to be sought and implemented to improve treatment adherence for pregnant and breastfeeding mothers of children under two years of age.

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