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EVALUATION OF KNOWLEDGE AND MANAGEMENT PRACTICES OF HYPERTENSION IN PREGNANCY AMONG HEALTH CARE WORKERS IN MOSHI URBAN, TANZANIA

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Key Abbreviations

ANC	Antenatal care or clinics
LW	Labor Ward
HCW	Health Care Worker
HT	Hypertension
PHC	Primary Health Care Clinics
PIH	Pregnancy Induced Hypertension
WHO	World Health Organization

CHAPTER ONE

1.1.0 Introduction

1.1.1 Epidemiology

Hypertensive diseases of pregnancy are considered to be common causes of maternal deaths world wide [1]. Of all pregnancies 7 to 9 percent are complicated by hypertension. About 1% of pregnancies are complicated by preexisting hypertension, 5% to 6% by gestational hypertension without proteinuria (half of which presents preterm), and 2% by preeclampsia [2]. In 2008, 358,000 women died during or following pregnancy and childbirth. Almost all of these deaths (99%) occurred in developing countries and most could have been prevented [3]. Nearly 80% of the maternal deaths are caused by the five direct obstetric causes namely haemorrhage, hypertension, sepsis, obstructed labour and complications of abortion, see Figure 1. Hypertension in pregnancy (preeclampsia and eclampsia) contributes to 18% of the deaths, being the second after hemorrhage as the most common cause of maternal deaths. Apart from causing mortality preeclampsia and eclampsia are associated with severe maternal and perinatal morbidity like intrauterine growth retardation, premature delivery, and early neonatal deaths. In Ethiopia they found albuminuria in 11.5% and abnormal diastolic blood pressure in 12.2%, where 2.9% (all of whom lived in urban areas) and 9.2% were classified as pre-eclamptic and gestational hypertensive, respectively. 52.3% were not receiving antenatal care services [4]. A World Health Organization analysis of causes of maternal death states that 9,1% of maternal deaths in Africa are due to hypertensive disorders [5].



Figure 1- Causes of maternal deaths worldwide

In many low-income countries, complications of pregnancy and childbirth are the leading cause of death amongst women of reproductive years. Most maternal deaths are potentially avoidable. They could be prevented by access to emergency obstetric care and skilled attendance during pregnancy, childbirth and at immediate postnatal period. Hypertension in pregnancy is among the few direct causes of maternal deaths that can be detected and prevented during pregnancy. Studies have shown that, antenatal screening for hypertension and proteinuria followed by close monitoring and treatment of pre-eclampsia reduced eclampsia related maternal mortality in by 48-68% [6,7]. Therefore availability of magnesium sulphate for treatment of pre-eclampsia and eclampsia at health facilities and availability of skilled health personnel with knowledge and skills in managing hypertension is vital for prevention of hypertensive related deaths [8].

Many studies have evaluated evidence-based interventions to reduce hypertension related maternal deaths. Systematic screening of pregnant women during antenatal period for hypertension, routine calcium supplementation for women at high risk of pre-eclampsia, treatment of pre and eclampsia with magnesium sulphate and early delivery if women with pre-eclampsia and eclampsia have all been extensively studied and have a potential to reduce the risk of maternal deaths by 84% [9,10,11]. These interventions are however required

to be given by skilled health providers. Limited literatures exist on how knowledgeable the health care professionals are regarding to hypertension in pregnancy and its management in developing countries where maternal deaths are high.

Many of the root causes are related to poverty and inequity of opportunity for women. In low-income countries, primarily in Africa and Asia, maternal mortality is still 100-200 times higher than it is in Europe and North America. There is no other public health statistic for which the disparity between rich and poor countries is so wide [12]. Such a discrepancy poses a huge challenge to meeting the fifth Millennium Development Goal to reduce maternal mortality by 75% between 1990 and 2015 [13]. In high-mortality countries today, especially for the poorest populations, health systems are frequently the source of catastrophic costs, and deepening social exclusion. The picture for maternal mortality, while not yet benefiting from as carefully calibrated an epidemiological mapping, was similarly clear: skilled care in delivery and particularly access to emergency obstetric care in the case of complications would greatly reduce maternal deaths by about 75% according to World Bank estimates [14].

1.1.2 Pathology and complications

Pre-eclampsia is a disorder of placental development thought to arise from a mismatch between uteroplacental supply and fetal demands. The resulting placental release of biologic factors causes systemic maternal endothelial cell dysfunction and end-organ complications that include severe hypertension, eclampsia, pulmonary edema, and HELLP syndrome (hemolysis, elevated liver enzymes and low platelet count) [14].

Hypertensive diseases of pregnancy are characterized by multi system involvement, with complications commonly occurring in the renal, hepatic, cardiovascular, hematologic and central nervous systems. Early detection and multidisciplinary treatment is important, together with obstetric intervention [15].

Placental abruption, preterm delivery, perinatal death, small for gestational age infants, and neonatal respiratory distress syndrome have all been reported to occur more commonly among women who develop severe gestational hypertension without proteinuria than

among women who develop proteinuria without severe hypertension [2]

1.1.3 Classification of high blood pressure in pregnancy [1]

- Chronic hypertension: Hypertension prior to conception, or diagnosed before 20th week of gestation that does not resolve postpartum. Called "essential hypertension" if there is no underlying cause, and "secondary hypertension" if there is an underlying cause.
- Preeclampsia-eclampsia: Preeclampsia is a systemic disease with hypertension accompanied by proteinuria after 20th week of gestation. Eclampsia defined as the occurrence of seizures in preeclampsia.
- Preeclampsia superimposed on chronic hypertension: Describes hypertensive women who develop new onset proteinuria, proteinuria before 20th week of gestation, or sudden uncontrolled hypertension
- Gestational hypertension: High blood pressure after mid-pregnancy without proteinuria: this diagnosis is used only during pregnancy with definitive diagnosis made post partum. [15, 16]

1.1.4 Diagnosis

Hypertension is arbitrarily defined as a sustained blood pressure of $\geq 140/90$ mm Hg, regardless of gender or pregnancy status [17]. There is consensus that sustained severe hypertension should be treated. Severe hypertension is defined as a systolic blood pressure ≥ 160 to 170 mm Hg and/or diastolic blood pressure ≥ 110 mm Hg [2]. No conclusions can be made about the relative maternal or perinatal benefits/risks of antihypertensive therapy for mild-to-moderate pregnancy hypertension, regardless types [17]. Blood pressure measurement and urine analyses are the mainstay of the diagnosis and monitoring of hypertensive disease during pregnancy [15]. Early detection of hypertension requires accurate measurement of the woman's blood pressure. A professional nurse should carefully do this task, which too often is left to unlicensed assistant personnel. Another important step is to differentiate between hypertension that was present prior to pregnancy and

hypertension associated with the pregnancy-specific disease of preeclampsia [16]. In low-income countries, the contribution of chronic hypertension to hypertensive disease during pregnancy remains speculative because pre-pregnant blood pressure is not widely available [15].

Twenty-four-hour ambulatory blood pressure monitoring can show alteration in the normal pattern of blood pressure variation, a feature particularly relevant in preeclampsia, as these women showed an impairment in the night-time fall on blood pressure present in both normotensive and gestational hypertensive patients. But there is no randomized controlled trial evidence to support the use of ambulatory blood pressure monitoring during pregnancy [18].

1.1.5 Treatment and management

All antihypertensive agents have been shown or should be assumed to cross the placenta and reach the fetal circulation. ACE inhibitors and angiotensin receptor antagonists when taken later in pregnancy are associated with a characteristic fetopathy and are the only antihypertensive agents contraindicated in pregnancy. Atenolol is not recommended for use in pregnancy, given particular concerns about its potential to increase the risk of a small for gestational age infant [17].

WHO states that magnesium sulphate is the drug of choice for both prevention and treatment for eclampsia [19].

Maternal deaths from hypertensive disorders in pregnancy can probably be reduced markedly by [1]:

1. Promoting antenatal care and instituting a recall system for defaulters
2. Instituting regional centers and regional obstetricians to provide advice on, or care for, women with severe preeclampsia
3. Educating health professionals through continuing professional education and the use of clinical guidelines of management.
4. Informing the general public on complications associated with the preeclampsia/eclampsia syndrome.

1.1.6 Management of pregnancy-induced hypertension, pre-eclampsia, and eclampsia

- WHO's guidelines [19]

Pregnancy-induced hypertension:

Diastolic blood pressure is 90-100mmHg and there is no proteinuria. The woman is usually managed as an outpatient.

- Weekly follow up at home or local clinic: Monitor blood pressure, urine (for proteinuria) and fetal condition (growth, movement, heart rate)
- Check if the woman has severe headache, visual disturbances or abdominal pain.
- Counsel the woman and her family about the danger signals of severe preeclampsia, ensuring that they know the importance of obtaining immediate medical help if any of these signs develop.
- If the blood pressure decreases to normal levels and there are no other complications, the condition has stabilized and the woman should be allowed to proceed with normal labour and childbirth. If the blood pressure rises, however, and/or proteinuria develops, or there is significant fetal growth restriction or fetal compromise, treat as for preeclampsia (see below)

Mild preeclampsia:

Diastolic blood pressure is between 90-110 mmHg and there is up to 2+ of protein in the urine. Refer the woman to a hospital.

If gestation is less than 37 weeks:

- If signs remain unchanged or normalize, follow up twice weekly as an outpatient. Monitor blood pressure, urine (for proteinuria), reflexes and fetal condition (growth, movement, fetal heart). Counsel the woman and her family about danger signs of severe preeclampsia and eclampsia. Encourage additional periods of rest, and to eat a normal diet. Do not give diuretics, anticonvulsants, antihypertensives, sedatives or tranquillizers.
- If there are signs of growth restriction, consider an early delivery; if not continue hospitalization until term.
- If urine protein level increases, manage as severe preeclampsia (see below).

If gestation is more than 37 weeks:

- If there are signs of fetal compromise, assess the cervix and expect delivery. If the cervix is favorable (soft, thin, partly dilated), rupture membranes with an amniotic hook or a Kocher clamp and induce labour using oxytocin or prostaglandins. If the cervix is unfavorable (thick, firm and closed), ripen the cervix using prostaglandins or a Foley catheter or deliver the woman by caesarean section.

Severe preeclampsia and eclampsia:

In severe preeclampsia delivery should take place within 24 hours of the onset of the symptoms; in eclampsia delivery should take place earlier, within 12 hours of the onset of convulsions.

The management of eclampsia involves six stages:

1. Making sure the airways are clear and the woman can breathe.
2. Controlling the fits (drug of choice is magnesium sulphate).
3. Controlling the blood pressure (drug of choice is hydralazine).

4. General care and monitoring, including controlling fluid balance.
5. Delivering the baby.
6. Monitoring carefully to prevent further fits and identify complications.

1.1.7 Literature review

A meta-analysis from British Medical Journal states that mean arterial pressure is a better predictor for preeclampsia than systolic blood pressure, diastolic blood pressure, or increased blood pressure. Blood pressure measurements at the first antenatal visit for healthy normotensive women in the first and second trimester do not help predict preeclampsia [20].

Another meta-analysis from Elsevier revealed that the only interventions shown to prevent preeclampsia are antiplatelet agents, primarily low dose aspirin, and calcium supplementation. Magnesium sulfate can prevent and control eclamptic seizures. For preeclampsia, it more than halves the risk for eclampsia (number needed to treat 100, 95% confidence interval 50-100) and probably reduces the risk for maternal death [1].

A study conducted in Ethiopia regarding high-risk pregnancies states the need for an improved social environment, appropriate training of community health workers, and strengthening maternity services, including family planning services. It also revealed that 85% of all the pregnancies in this specific study had at least one risk factor and therefore was considered a high-risk pregnancy [4].

A review from Expert review states that most antihypertensive agents are safe, but angiotensin-converting enzyme inhibitors are teratogenic and fetotoxic. The first-line antihypertensive treatment that should be administered during pregnancy if chronic hypertension exists is methyldopa. The first-line antihypertensive treatment that should be administered during pregnancy if preeclampsia exists is labetalol. Hypertensive disorders of pregnancy increase risk of cardiovascular disease in later life [21].

An article from Current Hypertension Reports states that there is consensus that blood

pressure should be treated when it is sustained at ≥ 160 to 170 mm Hg systolic and/or ≥ 110 mm Hg diastolic because of the short term risk of maternal vascular damage, particularly stroke. There is no consensus regarding management of non-severe hypertension [2].

An intervention review from The Cochrane Collaboration says that there is no randomized controlled trial evidence to support the use of ambulatory blood pressure monitoring during pregnancy [18].

An article published in International Journal of Gynecology and Obstetrics, revealed that in low-income countries, challenges associated with hypertensive disease during pregnancy relate to the lack of cheap and reliable tools for diagnosis, management, and prevention. Although there is a clinically proven, highly effective, cheap, and safe intervention for preeclampsia/eclampsia, there are barriers to its large-scale implementation for reducing the impact of this preventable contributor to maternal morbidity and mortality [15].

A review from European Journal of obstetrics, gynecology and reproductive biology looked at different methods to reduce maternal and perinatal mortality in rural and peri-rural settings. One of the settings was Nigeria. In Nigeria professional midwives were trained in interpersonal communication and lifesaving obstetric skills, while referral hospitals were refurbished and equipped. That made maternal deaths decline among all causes [22].

1.2.0 Background information about Tanzania

1.2.1 Location and population:

Tanzania is located in Eastern Africa and has frontier to Kenya and Uganda in the north, Rwanda, Burundi and Democratic Republic of Congo in the west and Zambia, Malawi and Mozambique in the south. In the east lies the Indian Ocean [23].



The population is 43,739,000 people [24].

1.2.2 Maternal and newborn health situation (indicators):

The maternal mortality ratio in Tanzania from 2008 is according to WHO 790 per 100 000 live births [25]. The WHO countdown report from 2010 states that 76 percent of women in Tanzania aged 15-49 years attended antenatal care with a skilled health provider at least once during pregnancy. Around 43 percent delivered with a skilled health professional and 51 percent received postnatal care after delivery. The infant mortality rate was 74 per 1000 live births [26,27].

1.3.0 Statement of problem

Follow-up and treatment of pregnant hypertensive women are important because it can prevent preeclampsia and serious end-organ damages. The mortality and morbidity for the women and their children associated with preeclampsia and its complications are a major burden, particularly in low-and middle-income countries [12].

Many women (70%) are attending for antenatal care in developing countries. The incidence of hypertension in pregnancy and pre-eclampsia is similar in developed and developing countries [28]. However deaths due to eclampsia are few in developed compared to developing countries showing there is a missed opportunity to prevent hypertensive related maternal deaths in these countries due to substandard quality of care given. The reasons for substandard care on hypertension in pregnancy differ between settings in developing countries driving the need to have local data on what are the main problems from health system side; is it equipment and supplies, drugs, low knowledge and skills among providers or poor referral system.

There is a need for cheap and reliable tools with which to address the diagnostic, preventive, and management challenges associated with hypertensive disease during pregnancy in low-income countries. It is recommended that countries incorporate magnesium sulphate protocols into their national health and/or policies [15]. As stated by Langer et al, “ Scaling up the use of magnesium sulfate for treatment of eclampsia and severe preeclampsia will significantly advance the safe motherhood agenda and contribute to reaching the Millennium Development Goals by 2015” [12].

1.4.0 Justification of study

We intend to look at the WHO's guidelines regarding hypertension in pregnancy and see if they are followed by health providers in a developing country like Tanzania. We chose WHO's guidelines because it will be easier to compare our findings to other researchers, and because WHO's guidelines are supposed to be universal. This is an important study because it will give baseline information about the level of knowledge and practice of health providers on hypertension in pregnancy. The information will be vital for health managers of maternal and newborn programs because it will show where resources and efforts should be directed in order to improve outcomes of pregnancies with hypertension in developing countries.

1.5.0 Research question

What is the level of knowledge of health providers regarding hypertension in pregnancy and do the health personnel in Moshi, Tanzania, follow the WHO's guidelines for management and treatment of hypertensive, pregnant women?

2 CHAPTER TWO

2.1.0 Objectives

2.1.1 Broad objective

To assess level of knowledge and management practices of hypertension in pregnancy among HCW in Moshi urban district, Northern Tanzania.

2.1.2 Specific objectives

- To assess level of knowledge regarding HT in pregnancies among HCW in Moshi urban district.
- To describe level of knowledge regarding WHO guidelines for HT management among HCW in Moshi urban district.
- To describe the practice of HCW regarding management of HT during pregnancy.
- To assess if health facilities have adequate supplies, drugs and equipment for management of HT during pregnancy and delivery period.
- Examine procedures for blood pressure measurements of pregnant women.

3 CHAPTER THREE

3.1.0 Methodology

3.1.1 Study design

The study was a cross-sectional facility based study

3.1.2 Study area

The study was conducted at 2 primary health care clinics (PHC) with antenatal and delivery services in Moshi municipality, in northern Tanzania. The clinics included in the study were Majengo and Pasua clinics situated in Moshi urban district, one of the districts in Kilimanjaro region. Pasua clinic have 513 deliveries per year and 2748 women attending ANC per year. For Majengo we don't have these numbers. But we can assume they are about the same.

Kilimanjaro is one of the 26 regions in Tanzania. The capital of the region is Moshi.

Kilimanjaro Region is bordered to the North and East by Kenya, to the South by the Tanga Region, to the Southwest by the Manyara Region, and to the West by the Arusha Region.

With an area of 13,210km², Kilimanjaro Region is the smallest region among Tanzania Mainland's 21 regions. According to the 2002 Tanzania National Census, the population of the Kilimanjaro Region was 1,381,149, which are 4% of the country's population of about 43,739,000 people.

The Kilimanjaro Region is administratively divided into 7 districts: Rombo, Hai, Moshi Rural, Moshi Urban, Mwangi, and Same. According to the 2002 Tanzania National Census, the population of the Moshi Urban District is 144,336. The Moshi Urban District is administratively divided into 15 wards. The town is situated on the lower slopes of Mt Kilimanjaro, a volcanic mountain that is the highest mountain in Africa. The town covers an area of 58km² and lies approximately 3°18'S and 37°20'E. It slopes from about 950m above sea level to the North to 700m above sea level to the South.

Thanks to the government, local authorities, and Catholic and Lutheran missions, Moshi has universal primary education and the highest literacy rate in the vicinity.

The main hospital in the area is the Kilimanjaro Christian Medical College. This huge complex

serves a population of over 11 million individuals. The Good Samaritan Foundation opened it in March 1971.

The Kilimanjaro region has a good coverage of antenatal care. While the percentage of women who gave live birth, and received ANC from a professional health worker for Tanzania is 94%, the percentage for Kilimanjaro region is 99,2% [29].

Moshi urban has 3 government hospitals and 2 health centers with antenatal and delivery services.

3.1.3 Study population

Health personnel (Clinicians and nurses) working at antenatal, labour ward and postnatal clinics at the two selected clinics.

3.1.4 Inclusion

Clinicians, nurses or midwives working at antenatal, LW or postnatal clinic

3.1.5 Exclusion

Unskilled health personnel, health personnel from other departments, students.

3.1.6 Sample size and sampling method

Convenience sampling was used. All the HCW working at respective clinics during the study period were invited to participate.

3.1.7 Data collection method

Interviews were conducted with HCW to assess their level of knowledge and practices regarding HT in pregnancy. Observation of daily practices regarding management practices was done.

3.1.8 Data collection tools

A structured questionnaire with closed and open-ended questions was used to gather the needed information from the health workers. The questionnaire was constructed in English. This tool was used to determine the difference of knowledge amongst health workers regarding education, experience and socioeconomic factors as age, sex and educational region. In addition we had an observation checklist for practices and an inventory checklist

for supplies, drugs and equipments. These documents are in the appendix.

3.2.0 Variables

Dependent variables

- Level of knowledge on hypertension in pregnancy among health care providers
- Management practices of health care providers

Independent variables

- Age
- Sex
- Level of education
- Level of experience
- Attitude towards questionnaire

3.2.1 Pre-testing the questionnaire

Pre-testing of structured questionnaire was carried out in Arendal and Oslo, two cities in Norway, to find out areas of improvement before going to the clinics in Moshi, Tanzania. The test was done to health care workers, who met the inclusion criteria of the study. Language errors, flow and inconsistent of questions was corrected.

3.2.2 Ethical consideration

Ethical clearance was sought from medical department of Moshi municipal council. Introduction and aim of the study were clearly made to respondent before signing the consent form (only if she/he agreed). The participant was asked to sign informed consent for the study. The participants had the opportunity to withdraw from the study at any time without consequences. The study participants had the right to know what aim of the study was. Confidentiality and respect of the personal privacy was maintained and collected data will not be used in any other purposes.

3.3.0 Data processing and analysis

3.3.1 Data processing

Each day at the clinics, the questionnaires were checked. Coding of open-ended questions and data entry was done on daily basis. Cleaning of data was done before the analysis.

3.3.1 Data analysis

Descriptive statistics was used to summarize the data e.g. proportions, means and medians with their measure of dispersion. Tables and charts were used to present summarized data. Differences between groups were assessed using percentages. Analysis was done using SPSS version 14.

3.4.0 Plan for utilization of results

The findings through this study was presented and submitted to the University of Oslo, Norway. A copy will be sent to Kilimanjaro Christian Medical Center (KCMC), University of Tumani.

4 CHAPTER FOUR

4.1.0 Results

In total, 34 HCW of 42 HCW (81%) from Majengo and Pasua were included in the study. 27 were women and 7 were men and all of them were educated in Tanzania. The socio-demographic results are shown in the list below. In total there were 16 health care workers in Majengo clinic and 18 at Pasua clinic respectively. Among the HCW in majengo 8 were doctors and 14 nurses, while in Pasua it was 8 and 14 respectively. Out of 22 HCW in Majengo 13 participated in the study (59%), while in pasua 21 (95%) of HCW participated.

4.1.1 Socio-demographic characteristics

In total, 34 HCW from Majengo and Pasua were included in the study, 27 were women and 7 were men and all of them were educated in Tanzania. The socio-demographic characteristics of the participants are shown in table 1 below. The age ranged from 24 to 60 years, with a mean age of 38 years old. Their mean experience was 11 years (0-30 years). The level of

education is variable in Tanzania, where you would need a degree to be a doctor at a big hospital, but suffice with a diploma on the countryside. The difference is the number of year with education.

Variable	Number	Percent
Sex		
male	7	20,6%
female	27	79,4%
Cadre		
doctor	12	35,3%
midwife	17	50,0%
nurse	5	14,7%
Education		
certificate	13	38,2%
diploma	18	52,9%
advanced diploma	3	8,8%
degree	0	0%
Clinic		
majengo	16	47,1%
pasua	18	52,9%

Table 1- Sociodemographic characteristics

4.1.2 Knowledge of HCW regarding different aspects of hypertension during pregnancy

Knowledge on when to start ANC

Table 2 depicts HCWs knowledge on when the pregnant women should begin antenatal care. Fifty percent (17 HCW) stated that ANC should start in the 1st trimester of the pregnancy. Only 1 HCW (2,9%) would have it started in the 3st trimester. Among those who wrote 2st trimester it was equally divided between doctors and midwives, the same goes also for those who replied 1st trimester. There was little difference between the two clinics, Majengo and Pasua.

	Frequency	Percent
1. trimester	17	50%
2. trimester	15	44,1%
3. trimester	1	2,9%
Total	33	97,1%
Missing	1	2,9%

Table 2- At which trimester should ANC start?

Knowledge about hypertension in pregnancy

Nearly sixty five percent (22) HCW knew that the blood pressure is high in pregnant woman when is $\geq 140/90$ mm Hg. The rest had different answers and vary between 130-160 mmHg in systolic and 80-100 mmHg in diastolic pressure. Most of the HCW at Majengo agreed on 140/90 mmHg as a high blood pressure in pregnancy. At Pasua they are not that consistent, and the answers differ highly.

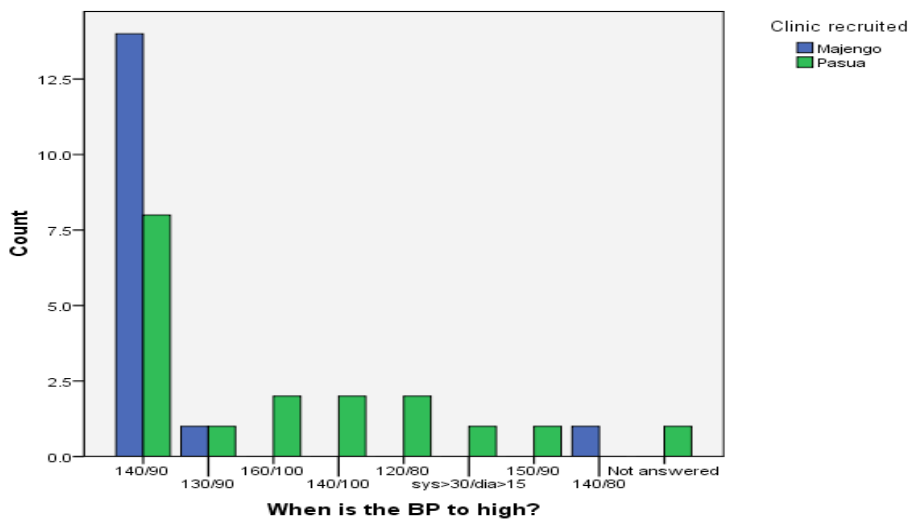


Figure 2- When is BP to high?

Definition pre-eclampsia

According to WHO's definition pre-eclampsia is defined as high BP during pregnancy ($> 140/90$) and presence of proteinuria. In total, 56% (19) of the participants had adequate knowledge of the definition of pre-eclampsia. There wasn't much difference if when knowledge about preeclampsia was compared between the HCWs at Pasua and Majengo clinics respectively. We define adequate knowledge as correct answer according to WHO's guidelines.

	Frequency	Percent
Adequate knowledge	19	55,9%
Inadequate knowledge	15	44,1%
Total	34	100%

Table 3- Definition preeclampsia

4.1.3 Knowledge about management of hypertension

Management and treatment hypertension during pregnancy

The WHO guidelines and the Tanzanian guidelines differ slightly in the case management of hypertension during pregnancy. The WHO guidelines do not recommend treating HT in pregnancy with antihypertensive drugs, but the Tanzanian guideline recommends treating with hydralazine or methyldopa when the blood pressure exceeds 140/90 mmHg. We have therefore chosen to see if the knowledge is adequate either to the WHO guidelines or the Tanzanian guidelines. About eighteen percent of the HCW had adequate knowledge on how to manage hypertension during pregnancy according to the guidelines recommended by the WHO, and 50% had adequate knowledge according to the Tanzanian guidelines. Most of the doctors had adequate knowledge according Tanzanian guidelines, compared to WHO's guidelines, where none had adequate knowledge.

How to manage and treat hypertension

	Frequency	Percent
According WHO		
Adequate knowledge	6	17,6%
Inadequate knowledge	28	82,4%
Total	34	100%
According Tanzania		
Adequate knowledge	17	50%
Inadequate knowledge	17	50%
Total	34	100%

Table 4- How to manage and treat hypertension

Management and treatment pre-eclampsia

The WHO guidelines and Tanzanian guidelines also differ in recommendations for treatment of pre-eclampsia. WHO doesn't recommend treating pre-eclampsia with drugs, but the Tanzanian guidelines recommend treating with hydralazine or methyldopa. Only 12% of the HCWs had adequate knowledge regarding management of pre-eclampsia according to the Tanzanian guidelines and 20, 6 percent according to WHO. Adequate knowledge is correct

answer according to either Tanzanian or WHO's guidelines.

	Frequency	Percent
According WHO		
Adequate knowledge	7	20,6%
Inadequate knowledge	27	79,4%
Total	34	100%
According Tanzania		
Adequate knowledge	4	11,8%
Inadequate knowledge	30	88,2%
Total	34	100%

Table 5- How to manage and treat pre-eclampsia

How to manage and treat eclampsia

There are no differences between the WHO guidelines and the Tanzanian guidelines regarding management and treatment of eclampsia. Fifty nine percent of the HCW had adequate knowledge regarding management of eclampsia according to WHO's guidelines.

	Frequency	Percent
Adequate knowledge	20	58,8%
Inadequate knowledge	14	41,2%
Total	34	100%

Table 6- How to manage and treat eclampsia

4.1.4 Practice regarding management of hypertension based on observations during antenatal care

Blood pressure

We observed 99 antenatal visits and 66,7% of the pregnant women got their BP measured, 92,6% of the pregnant women at Majengo got their BP taken, compared to 35,6% at Pasua.

	Frequency	Percent
Yes	66	66,7%
No	33	33,3%
Total	99	100%

Table 7- Was the BP measured?

Weight

Almost every pregnant woman (96%) was weighed during the ANC visit. At Majengo it was 100%, while at Pasua the percentage of women weighed was 91, 2%.

Urine check

None of the pregnant women during the observation period at ANC were checked for proteinuria.

4.1.5 Inventory of necessary equipments & supplies for management of hypertension at the clinics

Table 9 depicts an inventory of equipments and supplies at Majengo and Pasua clinics. Both Majengo and Pasua had functional weighing machines and BP machines. While Majengo had both metyldopa and hydralazine, Pasua had neither. None of the two clinics had any guidelines regarding HT in pregnancy or pre-eclampsia.

Inventory	Majengo	Pasua
Weighing machine	Present	Present
BP machines	2	3
Urinestix	Present	Present
I.v. equipment		
Cannulas	Present	Present
I.v. fluids	Present	Present
Drugs at LW		
MgSO ₄	Not present	Present
Diazepam	Present	Present
Drugs at clinic		
Metyldopa	Present	Not present
Hydralazine	Present	Not present
Ministry of Health guidelines regarding hypertension during pregnancy	Not present	Not present

Table 8- Inventory checklist

4.1.6 Perceived challenges by HCWs

The most frequent perceived challenge was medicine access (52,9%). Manpower was a challenge perceived by 41,2% of the HCW. While 11,8% did not have any challenges regarding the treatment and management of HT in pregnancy and pre-eclampsia.

Variable	Number*	Percent*
Medicine access	18	52,9%
Manpower	14	41,2%
Bad complience	13	38,2%
Cannot afford medications	12	35,3%
Patients rarly to control	9	26,5%
Unsure when to treat HT/pre-eclampsia	4	11,8%
Unsure how to treat HT/pre-eclampsia	4	11,8%
Do not find any challenges	4	11,8%
Lack of equipment	2	5,9%

* Multiple answers were possible

Table 9- Perceived challenges

5 CHAPTER FIVE

5.1.0 Discussion

5.1.1 General

Knowledge of hypertension

Nearly 65% of the health care workers in Moshi had adequate knowledge on definition of high blood pressure during pregnancy. The level of variation is high and can be due to uncertainty regarding definition of hypertension. At Majengo they were much more consistent; this is not due to different percentage of doctors at the clinics, which were approximately the same percentage. This is higher than what a survey in Taiwan found, there adequate hypertension guidelines awareness was found in 49,5% of the total sample. Among the 7 dimensions of the Hypertension Management Questionnaire, the definition of hypertension, methods for blood pressure measurements and impact of high blood pressure on cardiovascular disease had the lowest rates of correct answers [30].

To detect high BP early it is important to start ANC in the first trimester. As many as 44, 1% (15 HCW) would start ANC at the second trimester. One HCW want to begin ANC in the third trimester, but one person is not enough to be significant and is therefore not taken under consideration. The definition of pre-eclampsia according to WHO are BP $\geq 140/90$ mmHg, proteinuria and edemas. To get adequate knowledge in our analysis, the HCW had to answer at least high BP and proteinuria. We find higher knowledge among the doctors, compared to midwives and nurses. This is corresponsive to what others researchers found, comparing the level of knowledge of physicians and midwives and nurses. The physicians scored an average of 55,2% correct answers compared to midwives and nurses who scored on average less than 50% correct answers [31].

Knowledge of management and treatment

The Tanzanian guidelines are different from WHO. The WHO guidelines recommend conservative treatment for hypertension and pre-eclampsia, with bed rest and frequent control of BP and urine for proteinuria. The Tanzanian guidelines on the other hand want to

treat hypertension and pre-eclampsia with antihypertensive like hydralazine or methyldopamin. Only 17, 6% of the HCW replied correctly according to WHO's guidelines on how to treat and manage hypertension, while 50% answered correct when looking at Tanzanian guidelines instead. This shows that the HCW are more familiar with the Tanzanian guidelines, but there is need for more information and education of HCW. When looking at the level of knowledge regarding pre-eclampsia we find the same pattern, only 20, 6% had adequate knowledge according to WHO and 11, 8% to the Tanzanian guidelines. Again, we find the need for more information and education.

The treatment of eclampsia is MgSO₄ or diazepam if MgSO₄ is not available, here the Tanzanian guidelines and the WHO guidelines do not disagree. Still the level of knowledge is not sufficient, 58,8% answered correctly. Usually the clinics have an average of one eclamptic woman per year. This could explain the lack of knowledge. They have 513 deliveries at Pasua, and 2748 women attending ANC per year.

Observations

We observed 99 ANC, 54 at Majengo and 45 at Pasua. Almost all of the women got their BP measured at Majengo, unlike Pasua where only 35, 6% was checked. This may indicate better structure and routines during the consultations at Majengo. This goes well with the impression we got during our observations. A survey conducted in Nigeria had a different result; there all the women got their BP measured [32]. The difference cannot be explained by lack of equipment as Pasua had three BP machines, and Majengo only two. Some women did not get their BP measured because the BP machine was being used by another HCW. This explains some of the missing measurements on both clinics. When it comes to weight measure, the clinics are more alike. Majengo measured the weight of every woman, which again shows good routines. Pasua measured 91, 2% of the women, which also is good. It seems like the HCW find it easier to measure weight than BP, this could be because of lack of experience, knowledge or that the workload is too heavy, so they find it too time consuming to measure both BP and weight. The mentioned reasons may also be the cause of why none of the women was checked for proteinuria, even though they had appropriate equipment. In the survey mentioned above, less than half of the pregnant women got their urine checked

for protein [32].

Inventory

There is no big difference between the clinics; the main difference is regarding the drugs. Pasua did not have any of the antihypertensive drugs recommended for pregnant women when we visited the clinic, because they were out of stock. But they had medications for eclampsia, which is important in case of an emergency. Similar results are found in a survey from Nairobi, Nigeria where 28% of the health facilities had magnesium sulphate, 40% anti-hypertensives and 68% parenteral anticonvulsants [33]. None of the clinics have any guidelines for eclampsia; this may be the cause of low level of knowledge. BP measurements is an important tool in health clinics, and in relation to the size of the clinics, two and three BP machines is not sufficient.

Perceived challenges

Medicine access seems to be the biggest challenge for the HCW and secondly manpower. This is much related to economy and more money could solve these problems. Especially manpower is very important when it comes to managing eclampsia; both clinics have only one midwife and one nurse on duty during the night. There are only a few HCW who state that they are unsure on how and when to treat hypertension and pre-eclampsia, which do not correlate with our results. A surprising finding is that 35, 3% report that many patients cannot afford the medications, even though medications for pregnant women are supposed to be free.

5.1.2 Limitation

This study was conducted in Moshi, urban district, and therefore these results can only give information about the situation in an urban district. It must be taken into considerations that Moshi is a small town in Tanzania and the results cannot be generalized to the rest of the country.

We stayed at the clinics for only 4 weeks, 2 weeks at each clinic. To receive more representative data, we should have stayed longer in order to give out more questionnaires

and observations. We got 34 HCW to answer our questionnaires, this is not enough to make any conclusions about the general level of knowledge. Some of the HCW did not want to answer, other were away on vacation. But we got 81% who replied, so it's satisfactory.

Some of the HCW had limited English skills, and this may have affected the results. But none reported any difficulties understanding the questions.

We have subsequently realized that some of the questions may have been unclear and therefore given wrong answers. This applies especially for question number 9, we should have specified that we wanted to know how to treat hypertension in pregnancy, not hypertension in general.

To get the HCW to answer the questionnaire alone and without help was a challenge. Most of them discussed the questions with each other before giving it back.

5.2.0 Conclusion

In our study we have been collecting information at two PHC's in Moshi, Tanzania. Tanzania is one of the world's least developed countries and maternal mortality is still a major problem. We have been giving out questionnaires to the HCWs to get an impression of the level of knowledge.

Our objectives were:

- To assess the knowledge and management regarding hypertension in pregnancy among HCW in Moshi, Tanzania.
- To describe the practice of HCW regarding management of hypertension during pregnancy in Moshi urban district.
- To assess if PHC have adequate supplies, drugs and equipment for management and hypertension during pregnancy and delivery periods in Moshi urban district.

Our conclusion to the first objective is that the level of knowledge and management of hypertension during pregnancy is too low. The percentage was 65 and 21, knowledge and management, respectively.

On the second objective we find that the practice is lacking routines and important procedures are omitted. The probability to find critical symptoms is therefore reduced.

Regarding the third objective we found insufficiency of supplies compared to the number of patients attending the clinic.

Our overall conclusion is general lack of knowledge and supplies, but to support this conclusion there is need for more and thorough studies. Our results were interesting; however the limitations are too many to land on a conclusion based on our analyses.

5.3.0 Recommendations

This study shows that the level of knowledge and routines at the PHCs is not sufficient. A large country as Tanzania needs to have clear guidelines and structure, which we found a lack of at the Pasua and Majengo clinics. Our recommendations after spending four weeks in Moshi are as follows:

- Higher level of education and information among the HCW concerning hypertension in pregnancy, and its complications and treatment.
- Awareness about the importance of urine analyses and BP measurement on regular basis during the pregnancy.
- Noticeable and clear guidelines on hypertension in pregnancy at the clinic.
- More investment in equipment and medications.
- Better structure and efficiency at the clinics.

6 CHAPTER SIX

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7 CHAPTER SEVEN

7.1.0 Appendices

7.1.1 Appendix 1: Consent Form

My name isOn behalf of the University of Oslo, Norway. I am conducting a study in Moshi urban District aiming at assessing the management and treatment of hypertension in pregnancies.

All health workers who will meet inclusion criteria during time of data collection will be requested to participate in the study. If the request is positively agreed, then participant will be asked questions through self reported adherence form.

You are kindly requested to participate in this study and give out your opinions and views. All information will be kept secretly, no name is needed on my research paper. Your participation is vital; however your participation is voluntarily. You are free to participate, refuse or withdraw at any time even without any effects. However your participation is

highly demanded and will be appreciated.

Therefore, I have read and understand the importance of this study.

Respondent signature

.....

Date.....

Interviewer signature

.....

Date.....

7.1.2 Appendix 2: Observation checklist

No (as in the questionnaire for the same person):.....

Sex:..... Age:..... Position at clinic:.....

1. Health worker measures BP?:

Yes

No

2. HW uses what to measure BP:

Manuel Automatic 24-hours monitoring

3. HW uses which BP-variable as a result:

Systolic BP Diastolic BP MAP Sys/Dia BP

4. Does the HW measure the BP several times?:

Yes

No

If yes, how many: 1 extra measurement 2 extra >3

5. Does the HW take any urin analysis?:

Yes No

6. Does the HW give any advice regarding the BP?:

Yes No

If yes, what sort of advice:.....

7. Any treatment given?:

Yes No

If yes, what sort of treatment:.....

7.1.3 Appendix 3: Inventory check list

1. Number of BP measurement equipments:

Manuel:..... Automatic:..... 24-hours monitoring:.....

2. Equipment to analyses urin:

Yes No

If not, where are they send:.....

3. Number of different BP-medication:

ATII-blockers:..... ACE-blockers:..... β -blockers:.....

Metyl-dopa:..... Diuretics:.....

4. Eclaptic medication:

Mag.sulphate:.....

7.1.4 Appendix 4: Questionnaire

Check only one box per question.

Part 1:

1. Sex

Female Male

2. Age:.....

3. Position at clinic:

Doctor Nurse Midwife Other

4. How long have you worked there

0-5 years 5-10 years 10-15 years More than 15 years

5. Where were you educated?

In Tanzania In other African country In Europe In Asia In America

Part 2:

1. With which equipment do you measure blood pressure?

Automatic Manuel 24hour monitoring

2. Which blood pressure-variable do you use as a result?

MAP Systolic BP Diastolic BP Sys/Dia BP

3. When do you measure the BP of a pregnant woman, without any risk factors, for the first time?

1.trimester 2.trimester 3. trimester

4. How often do you measure the BP of a pregnant women without any risk factors?

Every week Every month Every trimester

Only one time during the pregnancy Never

5. Are there any supplementary tests or exams done if the women has high BP(defined here as 160/90)?

.....

6. When are the BP considered so high, that you would initiate treatment?

Over 150/100 Over 160/110 Over 170/120

Over 180/130

7. What would you give to treat pre-eclampsia?

ATII-blockers β -blockers ACE-blockers

Metyldopamin Diuretics

Other Please specify which:.....

I would not give any specific medication

8. Where would you treat a pre-eclamptic woman after 37th week of gestation?

In the hospital As an outpatient

9. What would you give to treat eclampsia?

.....

Part 3:

1. Was there any questions that were unclear? If yes, please, write the number(s) of the question.

.....