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Original Article

Knowledge of Midwives in the Prevention of Vertical Transmission of Human Immunodeficiency Virus in Alfasher, North Darfur State, Sudan, 2024.

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Abstract

Background:
Vertical transmission of Human Immunodeficiency Virus (HIV) refers to the transmission of HIV from an infected mother to her child during pregnancy, childbirth, or breastfeeding. Effective prevention strategies are crucial to reducing the risk of this transmission. These strategies include the primary prevention of HIV infection among young women, prevention of unintended pregnancies in HIV-positive women, the use of antiretroviral drugs, and optimal management and support for both HIV-infected individuals and their infants. This study aimed to assess the knowledge of midwives regarding the prevention of vertical transmission of HIV.

Methods:
A descriptive cross-sectional study was conducted across six health centers and four Internally Displaced Persons (IDP) camp clinics in Alfasher, North Darfur State, Sudan. A total of 79 midwives participated in the study, selected through simple random sampling. A questionnaire, pre-tested by a pilot study was used. It covered participants' sociodemographic data, knowledge of HIV/AIDS, vertical transmission and its prevention.

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Results:
The study found that midwives had inadequate knowledge of HIV/AIDS, vertical transmission and its prevention. About half of the participants reported that HIV/AIDS topics were not included in their midwifery curriculum. Additionally, 61% stated that the Prevention of Mother-to-Child Transmission (PMTCT) program was not implemented in their workplace, and 76% reported a lack of essential supplies at their healthcare facilities.

Conclusion:
The study revealed a significant deficiency in midwives' knowledge of HIV/AIDS, vertical transmission and its prevention, highlighting a concerning knowledge gap regarding PMTCT of HIV. The study recommends strengthening midwifery continuing education programs and refresher courses focused on updated HIV protocols. Additionally, it is essential to ensure the consistent availability of supplies at health facilities to support the prevention of mother-to-child transmission of HIV.

Keywords: Midwives, Knowledge, Prevention of HIV Vertical Transmission, PMTCT, IDP Clinics.

Introduction

More than 90% of children born to mothers infected with Human Immunodeficiency Virus (HIV) are at risk of developing the infection through vertical transmission. However, these infections can be effectively prevented through several key interventions, including HIV testing during pregnancy, initiating antiretroviral treatment by 14 weeks of gestation, optimal management during labor, making informed decisions regarding breastfeeding and ensuring proper care for the infant [1]. Approximately 1,800 new HIV infections occur among children every day, with about 90% of these infections resulting from mother-to-child transmission. Despite significant efforts in the Prevention of Mother-to-Child Transmission (PMTCT), around 1.7 million children were living with HIV in 2019, and 150,000 children were newly infected, primarily through vertical transmission [2]. Poor knowledge among healthcare workers, the rising incidence of HIV infections, and poorly coordinated and integrated services have been identified as major challenges hindering efforts to eliminate vertical transmission of HIV [3]. Inadequate understanding of vertical transmission programs (VTP) among healthcare workers has been documented as a key factor affecting the success of these programs [3]. PMTCT of HIV remains a top priority in global efforts to control the HIV epidemic. As HIV management continues to evolve, it is crucial to reinforce nursing and midwifery care through evidence-based practices. Research has consistently shown that such practices play a vital role in reducing the risk of mother-to-child transmission and significantly improving health outcomes for both mothers and infants [4]. Lack of knowledge and awareness regarding HIV/AIDS continues to be a significant barrier to accessing essential services and negatively impacting the quality of care provided at the service level. This critical gap highlights how inadequate training and education on HIV/AIDS contribute to these challenges and hinder effective care delivery [5].

In Sudan, it is estimated that 59% of all new HIV infections occur in women aged 15–49 years. Thus, preventing vertical transmission of HIV is crucial to reducing the risk of HIV transmission to children and decreasing new HIV infections among them. However, the standard implementation of PMTCT programs has been limited due to factors such as inadequate access to antenatal HIV testing during pregnancy (less than 1%), limited access to antiretroviral therapy (less than 10%), and insufficient training for healthcare providers [1]. There are multiple challenges in implementing effective PMTCT programs, including shortage of healthcare workers, limited provider knowledge, restricted access to HIV prevention services for women attending maternal and child health services, poor engagement from pregnant women, and misconceptions—such as the belief that HIV testing is needed only during pregnancy. Additionally, the perception that antenatal care is solely for women often leads husbands to avoid prenatal visits, while stigma and discrimination from health workers against HIV-positive mothers further worsen the situation [6]. A study conducted in Lagos, Nigeria (2021) to assess health providers' perspectives on the challenges of implementing PMTCT services identified several barriers to efficient service delivery, including insufficient training, lack of essential facilities, low wages, disorganized workflows, and patient-related HIV stigma [7].

This study aimed to assess midwives' knowledge regarding the prevention of

vertical transmission of HIV in Al-Fasher city, North Darfur State, Sudan.

Methods

This descriptive cross-sectional study was conducted in six health centers (1. Alsultan Health Center, 2. Alsalam Health Center, 3. Awlad Alreef Health Center, 4. Said Alshohadaa Health Center, 5. Babikir Nahar Health Center, and 6. Tumbasi Health Center) and four internally displaced persons' (IDP) camp clinics (Abushook Camp Clinic, Alsalam Camp Clinic, and Zamzam Camp Clinics A and B). A total of 79 midwives participated in the study, selected using simple random sampling.

Pre-testing of the data collection instrument:

The questionnaire was prepared in English, translated into Arabic, and simplified twice to ensure clarity for participants. It was then piloted with 10 midwives two weeks before the main study to test reliability and confirm its suitability. The questionnaire included sections on participants' sociodemographic data, knowledge about HIV/AIDS, vertical transmission, and prevention.

Data were collected using a self-administered questionnaire. The data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 20. Statistical significance was assessed using the Chi-square test. Confidence intervals (CIs) were set at 95%, and p-values <0.05 were considered statistically significant. Results were presented as frequencies, percentages, and mean scores, and summarized in tables.

Ethical approval was obtained from the Institutional Review Board at Al Neelain University, as well as from the General Director of the North Darfur State Ministry of Health. Written informed consent was obtained from all participants prior to data collection.

Results

Table 1 shows the demographic data of the study participants. Most of them (57%) were mature adults above the age of 36 years. The vast majority (91%) were trained midwives; only 9% being nurses in midwifry and none of the particpants had university or higher degrees.

Table (1): Demographic characteristics of the study participants (n=79)

Variable	ParticipantsNumbers.	Percentage %
Age groups (Yrs)		
25-30	19	24.0
31-35	15	19
36-40	15	19
Above 40	30	38
Total	79	100
Health Setting		
IDP Clinics *	32	40
Health-centers	47	60

Total	**79**	**100**
Qualification		
Midwife	72	91
Nurse- Midwife	07	09
BSc**	00	00%
Total	79	100
Years of Experience		
1-5y	**10**	13
6-10y	**10**	13
11-15y	**14**	18
16-20y	**11**	14
21-25y	**07**	09
26-30y	**03**	04
Above 30y	**24**	30
Total	**79**	**100.**
***IDP: Internally Displaced persons' Clinics **BSc: Bachelor of Science		

Table 2 shows variables related to educational and training facilities to help combating HIV infection related to mother and child health care. It is note worthy that about half of the participants were aware of curricula related to HIV/AIDS in midwifery, about 80% participated in workshops related to prevention of vertical transmission of HIV, but only 9% had knowledge related to implementation of antenatal counseling and testing for HIV in health setting.

Table (2): Work related variables of participants (n= 79)

Variables	Response	Frequency	Percentage
1. HIV/ AIDS in midwifery curriculum.	Yes	38	48
	No	41	52
	Total	79	100
2. Participation in HIV/ AIDS workshop	Yes	31	39
	No	48	61
	Total	79	100
3. Participation in prevention of vertical transmission of HIV workshop.	Yes	62	79
	No	17	21
	Total	79	100
	Yes	36	46

4. Implementation of Prevention of vertical transmission program in health setting.	No	43	54
	Total	79	100
5. Implementation of Antenatal counseling and testing for HIV in health setting.	Yes	7	9
	No	72	91
	Total	79	100
6. Availability of Supplies (gloves, water delivery-sets, antiseptics)in health setting	Yes	19	24
	No	60	76
	Total	79	100

Table 3 shows that the overall knowledge of the participants of items related to HIV/AIDS was alarmingly low, being 12 out of a possible maximum score of 25.

Table (3): Oveeall knowledge of participants (no=79)

Variables	Mean of correct respones	Std.
1. General knowledge about HIV/ AIDS.	5.8	1.7
2. Knowledge about vertical transmission of HIV.	3.1	1.6
3.Knowledge about prevention of vertical transmission of HIV	3.1	1.5
4.Overall mean knowledge (out of a possible maximum score of 25)	12.1	3.1

Table 4 shows comparison between the correct responses of midwives and nurse-midwives in items related to knowledge about HIV/AIDS and its prevention. There was a significant difference (P=0.02) in favour of trained midwives in general knowledge about HIV/AIDS. However, the difference between the two groups was not statistically significant when considering knowledge about issues related to vertical transmission.

Table (4): knowledge of participants according to Qualification (no=79)

Variables	Qualification	No	Mean	Std.	P Value
1.knowledge about HIV/AIDS	Midwife	72	5.52	1.8	0.02
	Nurse-midwife	7	5.47	1.7	
2.knowledge about vertical transmission of HIV	Midwife	72	3.88	2.1	0.08
	Nurse-midwife	7	3.53	1.5	
3.knowledge about prevention of vertical transmission of HIV	Midwife	72	4.47	2.4	0.25
	Nurse-midwife	7	4.20	1.9	
4.Overall knowledge	Midwife	72	13.87	5.08	0.03
	Nurse-midwife	7	13.2	3.82	

Table 5 shows that there was no significant difference in the mean scores of questions related to HIV/AIDs considering the age groups.

Table (5): knowledge of participants according to their age (no=79)

Variables	Age	N0	Mean	Std. Deviation	P value
1.knowledge about HIV/AIDs	25-30	19	5.96	1.45	0.49
	31-35	15	5.74	2.03	
	36-40	15	5.06	2.25	
	above 40	30	5.67	2.10	
2.Knowledge of Vertical	25-30	19	3.79	1.93	0.91
	31-35	15	4.13	2.07	
	36-40	15	4.06	2.16	

Transmission of HIV	above 40	30	3.75	2.01	
3.Knowledge of prevention of vertical transmission of HIV	25-30	19	4.00	2.05	0.28
	31-35	15	5.22	2.71	
	36-40	15	4.76	2.31	
	above 40	30	4.08	2.50	
4.Overall knowledge	25-30	19	13.75	4.30	0.80
	31-35	15	15.09	5.84	
	36-40	15	5.96	1.45	
	above 40	30	5.74	2.03	0.49
	Total	79	40.54	2.25	

Discussion

The demographic characteristics of participants revealed that the majority were above 40 years of age, suggesting that the workforce is relatively experienced, which could positively influence the quality of care provided. However, this may also present challenges in adapting to new knowledge in HIV treatment and prevention. A majority of midwives (59.5%) worked in primary health facilities, providing essential education and maternal and child care, while 40% worked at internally displaced persons (IDP) camp clinics, where overcrowding, limited resources, and poor healthcare access may delay care delivery. The fact that most participants (91.1%) were midwives underlines their essential role in maternal care and preventing vertical HIV transmission.

Many previous studies highlighted that the Millennium Development Goals (MDGs) prioritized combating HIV/AIDS and aimed to reduce the global maternal mortality ratio to less than 70 per 100,000 live births. These efforts intensified the importance of PMTCT in improving health outcomes for mothers and children. However, the absence of higher qualifications such as BSc or postgraduate degrees among participants in this study suggests potential gaps in the specific knowledge required to enhance their effectiveness in HIV prevention. Most participants had over 30 years of experience, contributing significant clinical expertise. These findings differ from a study in Malawi (4), which showed that participants ranged from 22 to 61 years of age, the majority being nurse midwifery technicians (61.7%) and 8.6% registered nurses, with most holding bachelor's degrees. The difference may be attributed to disparities in midwifery education opportunities and access to resources.

In terms of education and work-related variables, 52% of participants reported that HIV/AIDS topics were not included in their formal midwifery curriculum, indicating a critical gap that could limit their ability to educate mothers about HIV prevention. Although 78.5% had participated in HIV/AIDS workshops, it is concerning that 54.4% of midwives had not participated in PMTCT-specific training. This is particularly alarming given that many studies emphasize PMTCT as a vital strategy in preventing vertical transmission of HIV. Additionally,

61% reported that PMTCT programs were not implemented in their healthcare settings, underlining the urgent need to expand access to PMTCT services within maternal and child health programs, provide regular HIV/AIDS and PMTCT workshops, and integrate HIV-related topics into midwifery curricula.

A more alarming finding was that 91% of midwives reported that antenatal counseling and HIV testing were not implemented in their health facilities. These interventions are crucial for identifying HIV-positive pregnant women who require early treatment to reduce vertical transmission risk. Furthermore, 76% reported shortages of essential supplies necessary for maternal and neonatal care. These shortages likely result from inadequate funding, poor infrastructure, and supply chain management issues.

Midwives' knowledge regarding HIV/AIDS was inadequate, with a mean score of 3.8. Knowledge regarding vertical transmission and its prevention was even lower, with both areas scoring a mean of 3.1. The overall knowledge mean score of 12.0 (out of a possible 20–25) indicates generally low knowledge levels. This gap may reflect the lack of refresher courses or updated HIV protocols to bridge knowledge gaps and improve PMTCT skills.

These findings differ significantly from studies in referral hospitals in South Africa in 2024, which reported that 91.7% of nurses had good knowledge, with 80% finding PMTCT guidelines easy to use (3). Similarly, a study in Ibadan, Nigeria (2021) showed that 74.7% of healthcare providers had good knowledge of MTCT prevention (8). A study in Iran (2020) also found higher mean knowledge and attitude scores among midwifery students (9). Differences may be attributed to variation in educational structures, guideline accessibility, awareness, and management-level barriers.

Regarding qualifications, both midwives and nurse-midwives displayed similar general knowledge levels, with midwives scoring slightly higher (5.52 compared to 5.47). A p-value of 0.02 indicated a statistically significant difference. However, for knowledge of vertical transmission and prevention, midwives scored slightly higher but without statistically significant differences (p-values of 0.08 and 0.25). These findings contrast with a study in Sudan, which found higher knowledge scores among midwives with master's degrees (10). Another study from South Africa (2022) highlighted barriers to PMTCT implementation, including negative attitudes among midwives, staff shortages, heavy workloads, limited refresher courses, and a lack of continuous monitoring and evaluation (11).

Conclusion

The Prevention of Mother-to-Child Transmission (PMTCT) program was introduced to eliminate vertical transmission of HIV. Therefore, PMTCT services must be integrated into primary healthcare settings to reduce child and maternal mortality associated with HIV infections. According to this study, midwives demonstrated inadequate knowledge regarding vertical transmission prevention. Contributing factors include the lack of HIV/AIDS education in midwifery curricula, limited participation in focused HIV/AIDS and PMTCT training workshops, and the absence of higher academic qualifications among participants. For improving PMTCT outcomes, there is a need to strengthen continuing education and refresher training, to ensure integration of HIV topics in pre-service education, and

guarantee the availability of essential supplies at health facilities.

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Conflicting Interests:

There were no feasible conflicts of interest with aspect to the authorship of this article.

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