Original Article

Non-Communicable Diseases as a Cause of Maternal Mortality

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Abstract

Objective: To determine the prevalence of non-communicable diseases as a contributing factor to maternal mortality.
Methodology: This descriptive study was conducted in the Gynae 'A' unit of Hayatabad Medical Complex, Peshawar, spanning from 2018 to 2022. Data were extracted from hospital records following approval from the ethical committee. The study included women who succumbed to non-communicable diseases as the cause of maternal mortality. Exclusions comprised cases of communicable diseases, direct maternal deaths, deaths due to accidental or incidental causes, or instances where complete data were unavailable. Informed consent for reviewing patient case sheets was waived due to the retrospective and non-interventional nature of the study. Relevant details such as age, parity, gestational period, booking status, mode of delivery, and type of non-communicable disease were documented using a pre-designed proforma. Descriptive statistics including frequency, percentage, mean, and standard deviation presented in tabular form.
Results: The study encompassed a total of 72 cases of maternal deaths. Among these, 43 (59.72%) were classified as direct maternal deaths, while 29 (40.27%) were deemed indirect. Non-communicable diseases were identified as the cause of 21 (29.16%) maternal deaths. The majority of patients were multigravida (61.90%) within the age range of 20-30 years. Cardiac diseases (34.78%) emerged as the most prevalent non-communicable cause of maternal mortality.
Conclusion: Non-communicable diseases represent significant contributors to maternal mortality, accounting for approximately one-third of maternal deaths. Among non-communicable diseases, cardiac ailments were the most frequently observed.
Keywords: Non-communicable diseases, maternal mortality, indirect causes, direct causes

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Introduction

Noncommunicable diseases (NCDs) are typically chronic conditions that persist over the long term, arising from a complex interplay of environmental, behavioral, genetic, and physiological factors.[1] Cardiovascular disorders (heart attacks, strokes), chronic respiratory diseases (asthma, chronic obstructive pulmonary disease), diabetes, and malignancies are the main types of noncommunicable diseases (NCDs).

Non communicable diseases cover a vast spectrum of acute, transient, chronic and permanent conditions.[2] NCDs affect people of all age groups, regions and countries. Studies have shown that 17 million NCD deaths due to non-communicable diseases occur before 70 years of age. About 86% of these premature deaths occur in middle and low income regions.[3] NCDs have been considered as a major challenge for sustainable development goals. According to Sustainable Development Goals (SDG target 3.4) it's the responsibility of all heads of the state and government to develop robust national strategies, in order to reduce premature mortality from NCDs by one third by the year 2030.[4] In order to achieve this Sustainable Development Goals WHO is playing a key leadership role to help the world community to fight against NCDs.[4,5] In Pakistan about 80 million of its individuals (approximately 50% of the population) suffer from one or more of these non-communicable diseases.[6] Death due to NCDs are now far more in number than deaths due to communicable disease. According to the Global Burden of Disease 2010 data about 77% of age standardized deaths in Pakistan occur due to NCDs and injuries. The morbidity

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due to NCDs is also tremendous and mostly because of stroke and injuries. Pakistan with the current economic condition is not prepared to deal with the epidemic of NCDs. Most of the policies are focused on the secondary prevention with little focus on the primary health care and disease prevention. Primary prevention is the best strategy to handle NCDs.[6,7] In 2014, the systematic analysis of the global causes of maternal deaths has shown the evidence of the burden of non-communicable diseases in maternal health.[8] Neoplasms, mental disorders, anemia, sickle cell disease, thalassemia, cardiovascular disorders like hypertension and chronic rheumatic heart disease, and endocrine or metabolic disorders like diabetes mellitus, hypothyroidism, and hyperthyroidism are among the significant NCDs that can occur during pregnancy. International Classification of Diseases (ICD) has divided maternal deaths into direct (obstetric-related) and indirect causes.[9,10] Deaths due to NCDs are considered amongst the fraction of “indirect” maternal deaths. Indirect maternal deaths are a consequence of “previous existing disease or disease that developed during pregnancy and not due to direct obstetric causes, but aggravated by physiologic effects of pregnancy”.[11]

About one-third of all maternal mortality is due to indirect deaths and NCDs contribute an important fraction to these deaths.[10] The systematic analysis has documented that the proportion of maternal deaths due to indirect causes is the same (27%) as direct causes due to postpartum hemorrhage and a higher proportion than hypertensive disorders.[8] Obstetric difficulties might frequently have a close relationship with medical conditions. For instance, chronic illnesses like diabetes, obesity, and hypertension are relevant to obstetric sequelae because they increase the risk of anesthetic and surgical intervention during the cesarean section, which is one of the sequelae. Non-communicable diseases have an effect on a woman's long-term health as well as her current and subsequent pregnancies.[12,13]

There is scarcity of data regarding the role of NCD during pregnancy. Especially the data from developing countries is limited and not very authentic. Most of this data is obtained from hospital record and not from the community services.[11,12] It’s important to have reliable data regarding NCDs during pregnancy in order to develop national strategies for the improvement of health care services. We have selected this topic because in Pakistan the data regarding NCDs during pregnancy is very limited.

Methodology

From January 2018 to December 2022, a descriptive study was carried out in the obstetrics and gynecology department of the Hayatabad Medical Complex in Peshawar. After receiving ethical committee approval, data were gathered from hospital records using a non-probability convenient sampling strategy. Women who passed away from non-communicable diseases were included in the study; however, women who died from communicable diseases, direct causes of maternal death, deaths from unintentional or incidental causes, or instances with insufficient data were not. Patients' informed agreement to examine their case notes was not required because the study was retrospective and non-interventional in nature.

Non-communicable diseases in pregnancy included certain chronic medical disorders such as endocrine or metabolic conditions (e.g., diabetes mellitus, hypo- and hyperthyroidism), cardiovascular conditions (like hypertension and chronic rheumatic heart disease), hematological conditions (such as anemia, sickle cell disease, or thalassemia), malignancies, and mental disorders.

An already-designed proforma was used to collect information about age, parity, gestational age, booking status, delivery mode, and kind of non-communicable disease. Data analysis was done with SPSS version 22. Calculations were made and tabulated data, including frequency, percentage, mean, and standard deviation, were displayed. Within a certain time frame, the number of maternal deaths per 100,000 live births was calculated to get the maternal mortality ratio (MMR).[8,9]

Results

A total of 72 cases of maternal deaths were included in the study. Out of which 43(59.72%) were direct maternal deaths, 29(40.27%) indirect. Non communicable diseases accounted for 21(29.16%) maternal deaths (Table I). The MMR for all causes was 249.85/100,000 live births, for non-communicable diseases it was 72.87/100,000 live births and for direct maternal deaths the MMR was 149.21/100000 live births. Most of the patients (90.47%) were referred from periphery hospitals in moribund condition. Only 2 (9.52%) patients were booked. Mean age of the patients was 26years with SD ±6.8. Out of 21 patients 13(61.90%) underwent cesarean section, 3(14.28%) had instrumental delivery and 5(23.80%) were delivered vaginally. (Table II)

Table I: Classification of non-communicable diseases. (N=21)

Variables	N (%)
Cardiac diseases	8 (34.78%)
Liver diseases	3 (13.04%)
Malignancies	3 (13.04%)
Ischemic stroke	1(4.34%)
Thrombocytopenia	2 (8.69%)
Diabetes +chronic hypertension	2 (8.69%)
Sickle cell disease	1 (4.34%)
Acute pancreatitis due to Gallstones biliary (GB) calculi	1 (4.34%)

Table II: Demographic details of sample size (N=21)

Variables		N(%)
Age(years)	<20	3(14.28%)
	20-30	13(61.90%)
	>30	5(23.80%)
Gravidity	Primigravida	5(23.80%)
	Multigravida	11(52.38%)
	Grand multi gravida	5(23.80%)
Period of Gestation(weeks)	<37	9(42.85%)
	≥37	12(57.14%)

Discussion

In our study almost 1/3rd (29.16%) causes of maternal mortality were because of non-communicable diseases. Cardiac diseases were the most common cause of non-communicable maternal deaths.

In a study conducted by Neha Kumari et al regarding pattern of non-communicable diseases during pregnancy and their effect on maternal outcome, it was shown that 1003 non communicable disease occurred in 894 women. Maternal mortality due to NCDs occurred in 0.7%. Chronic hypertension was the commonest (30.8%) NCD. Others non-communicable diseases included neurological (14.2%), cardiovascular (15.9%), endocrine (11.5%), chronic kidney (4.8%), autoimmune (7.6%), and chronic respiratory (4.3%) diseases, psychiatric disorders (3.8%), chronic liver disease (1.8%) and cancers (2.0%). Most NCD (67.0%) were diagnosed before pregnancy.[14]

McCaw-Binns AM et al in their study have also demonstrated an upward trend in maternal mortality due to cardiovascular diseases. While Haematological/immunological conditions ranked second.[15] According to 3rd confidential inquiry into maternal deaths conducted in Suriname the incidence of late maternal deaths was highest. In majority of these cases, the death occurred later than 42 days after delivery, but the initiating event developed during pregnancy or puerperium. Worldwide as the MMR lowers and the countries undergo “obstetrical transition”, i.e. the incidence of direct maternal deaths decreasing due to improvement in maternal health care system while the incidence of indirect causes of maternal mortality and non-communicable diseases increasing. Cardiac diseases especially post-partum cardiomyopathy was found to be the most important indirect cause of maternal mortality. In our study cardiac diseases was the most important indirect cause of maternal mortality.[16]

Cardiac diseases in low and middle-income countries are frequently underdiagnosed, potentially contributing to the broad spectrum of maternal mortality rates (ranging from 0% to 34%) reported among pregnant women with cardiac conditions. This review highlights a significant incidence of maternal deaths attributed to cardiac diseases in these regions. The study's findings indicate that the proportion of cardiac-related deaths among all maternal deaths tends to be higher in countries with lower Maternal Mortality Ratios (MMR), while the absolute number of maternal deaths due to cardiac diseases is highest in countries with elevated MMRs. This observation suggests that reported cases may only represent a fraction of the actual burden, indicating a potentially greater number of maternal deaths attributable to cardiac diseases. The findings of this study are in line with the obstetric transition model, which says that due to improvement in obstetric care, the direct causes of maternal mortality are declining while the proportion of indirect maternal deaths especially due to cardiac diseases are increasing.[17]

Manisha Nair in their study have reported that in many developed countries Indirect maternal deaths out number direct deaths due to obstetric causes and in developing countries maternal mortality due to indirect causes also increasing significantly. This review provides a detailed analysis of indirect maternal deaths in the UK, including the causes and trends, as well as issues related to care in underdeveloped countries. The UK's rate of indirect maternal fatalities has not decreased much since 2003. According to reports, heart disease was the most common cause of maternal mortality in 2011–2013, accounting for 68% of all indirect causes of mortality.[18]

Pre-existing medical disorders accounted for 66% of the increased risk of maternal deaths among antenatal patients. The most important analysis of this review has shown that, almost 50% of direct maternal deaths were associated with medical co- morbidities. In 2003-2009 the proportion of maternal deaths due to pre-existing medical disorders was estimated to be 20% (95%

uncertainty interval 16%–29%) in high-income countries as compared to 15% (95% uncertainty interval 9%–23%) in low and middle income countries.[18]

In a systematic review the frequency of malignant diseases as a cause of maternal death varied from 0.68-1.72/1000 live births. Breast, thyroid and melanoma were the most common types of malignancies.[19]

Shaikh AA in their study has documented 48 maternal deaths during the study period making MMR of 1578/ 100,000 live births. Most of maternal deaths were due to direct causes 79% (38) while indirect causes contributed to 21% (10) maternal deaths. The direct causes included deaths from eclampsia 27%, hemorrhage 33%, Sepsis 21%, and obstructed labour 8%. Indirect causes of maternal mortality included, hepatic encephalopathy, anemia and renal failure.[20]

According to Maternal Mortality Review Committee report 11% of maternal deaths were because of mental disorders. 63% of death were due to suicide and occur up to 1yr of delivery.[21] But in our study no death was related to mental health disorders. It may be because we have included maternal mortality up to 42 days and secondly most of these will present to emergency department as late maternal deaths.

In a study conducted by Julia H about 15% of maternal mortality was because of pre-existing medical disorders. Maternal mortality due to direct causes has decreased over the last 25 years, on the other hand small increases in the proportion of indirect causes have been observed. Over all maternal mortality from chronic rheumatic heart disease was 0.5% in Egypt and 6.2% in Sri Lanka. Direct causes of maternal mortality are often closely interrelated with medical disorder. Diabetes mellitus, can lead to macrosomia, which can then end up in different obstetrical complications such as obstructed labour, increased chances of operative delivery, genital tract trauma, PPH, sepsis.[22]

Conclusion

Non communicable diseases are important causes of maternal mortality. About 1/3rd of maternal deaths are due to non-communicable diseases. Cardiac diseases were the most common type of non-communicable diseases.

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