

Verbal autopsy of neonatal deaths in Khatauli Block of District Muzaffarnagar, Uttar Pradesh, India

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Abstract

Background

Verbal autopsy is a method of inquiry to ascertain the likely cause of death in populations where vital registration of deaths is incomplete and unreliable. Over 75% of deaths in India occur at homes; more than half of these do not have a certified cause. Further, most of the deaths in the rural areas of India occur at home and that is why a medical certification by a qualified practitioner is not possible.

Keeping these facts in mind, this study was designed having objectives as to find out the causes of neonatal deaths through verbal autopsy and its feasibility to be used by health workers.

Material & Methods:

This cross-sectional epidemiological study was conducted in randomly selected rural areas of Khatauli Block of District Muzaffarnagar, Uttar Pradesh, India. Verbal autopsy data was collected by a team of health workers adequately trained for the same well in advance. Data related to reported neonatal deaths in the study area in the specified period of time was collected on structured & pre-tested questionnaire used as study tool by interviewing the parents, relatives or neighbours of the deceased. Data thus collected was verified twice by the coordinator and principal investigator respectively and analyzed by using Epi info statistical package.

Results:

A total of 24 perinatal deaths were reported, out of which 7 (29.2%) were stillbirth and 17 (70.8%) were neonatal deaths. ANC was received by 14 mothers (58.3%). Half of the deliveries were conducted by untrained Dai. About 20

deliveries (83.3%) were at home and 10 (58.8%) of the deceased were early neonates. The cause of deaths found by means of verbal autopsies were mainly: pneumonia - 4 (23.5%), diarrhoea - 2 (11.8%) neonatal jaundice - 03 (17.6%) etc.

Conclusion:

Pneumonia, diarrhoea & neonatal jaundice alone constitute about 53% of the total neonatal deaths. The use of the verbal autopsy tool by health workers to find out the cause of neonatal deaths is very much feasible.

Key words: Verbal autopsy, neonatal deaths, pneumonia, diarrhoea.

Background

Verbal autopsy is a method of inquiry to ascertain the likely cause of death in populations where vital registration of deaths is incomplete and unreliable. It may be defined as an investigation of the chain of events or circumstances preceding death through interview of the mother or any other person who was looking after the patient, focusing on easily recognizable signs and symptoms¹. The term "verbal autopsy" was first proposed by Arnold Kielman and coworkers and quoted in a publication in 1983².

Over 75% of deaths in India occur in the home; more than half of these do not have a certified cause. India and other developing countries urgently need reliable quantification of the causes of death³. As most of the deaths in the rural areas of India occur at home, medical certification by a qualified practitioner is not possible, thus there is a need for verbal autopsy. Verbal autopsies have been validated and used for ascertaining the cause of death in many countries. In 1992, recognizing the need for uniform and valid criteria for diagnosing common causes of death, Bang AT and Bang RA proposed a set of criteria for the cause of death among neonates and those aged 1-59 months⁴.

Studies employing verbal autopsy have been conducted for research and planning purposes since the 1930s, although its first detailed and thorough application was in 1990 at Johns Hopkins University. The method is based on getting information about deceased persons, whose families allow investigation of the diseases that caused the deaths. In this way, inadequacy of information due to the absence of a health professional before the death can be overcome⁵.

The verbal autopsy method is based on three assumptions, as follows:

1. Various diseases can be distinguished based on their major clinical findings and symptoms. The validity of the method is high when the patient has clear findings, when these findings exist in all other such cases resulting in death, and when findings for other fatal illnesses are not present.
 2. Reports by the family of the deceased are vital in the identification of the prominence and severity of the signs and symptoms.
 3. The time interval after death is important to the identification and recollection of signs and symptoms⁵.
- Information on births and death are important for

Verbal autopsy of neonatal deaths estimating a society's health needs and necessary health services. Verbal autopsy tool had high sensitivity and specificity in both neonatal and post neonatal deaths. Keeping these facts in mind, this study was designed having objectives as to find out the causes of neonatal deaths through verbal autopsy and its feasibility to be used by health workers.

Material and Methods

Study design and the participants: It was a cross-sectional epidemiological study considering the deceased neonates as the study subjects.

Data collection/ methodology: This study was conducted in randomly selected 6 rural areas of Khatauli Block of District Muzaffarnagar, which is field practice area of Rural Health Training Center of the Department of Community Medicine, Muzaffarnagar Medical College, Muzaffarnagar, UP, India. First, a house to house survey was conducted to find out the number of perinatal deaths in the study areas, then data pertaining to the specific cause of neonatal deaths during 1st April 2014 to 30th September 2014 (past six months) was collected with the help of verbal autopsy study tool in between 1st October 2014 to 30th November 2014. The study tool was structured and pretested one and has five sections viz., socio-demographic profile of the respondents, environmental profile of the respondents, obstetrical history of the mother of the deceased neonates, delivery profile of the mother of the deceased neonates, profile of the deceased neonate and informations related to the mortality of the neonates. Verbal autopsy data was collected by a team of health workers adequately trained for the same well in advance by interviewing the parents, relatives and neighbours of the deceased and subsequently recorded on the verbal autopsy tool. On moral ground the health workers visited the deceased family only after a period of not less than one month. Prior consent was taken and the purpose of the study was adequately explained before administering the study tool upon the concerned respondents. Data thus collected was verified twice by the coordinator and principal investigator respectively and analyzed by using Epi info statistical package.

Inclusion criteria: All such respondents who wish to be part of this study were included.

Exclusion criteria: Neonatal deaths beyond the study period were excluded.

Sample size calculation: The respondents of all the reported neonatal deaths during 1st April 2014 to 30th November 2014 who gave their consent to be part of this study constituted the sample size.

Outcome Variable: Cause of neonatal deaths.

Explanatory variable: Illiteracy, socioeconomic status.

Ethical committee approval: IEC approval was taken before the start of the study.

Data management and statistical analysis:

Epi info statistical software was used for data recording and drawing up of suitable inferences.

Result:

A total of 708 births took place in the study area, 29 infant deaths and 24 perinatal deaths were reported in the same study area during the six months study period extending from 1st April to 30th September 2015. Among the 24 perinatal deaths, 7 (29.2%) were still birth and 17 (70.8%) were neonatal deaths. All (100%) the neonatal deaths were subjected to study tool and our study revealed the following findings about the cause of neonatal deaths with the help of verbal autopsy. Table-1 shows that maximum families were nuclear (70.8%). All the respondents were Hindu by religion. 45.5% of the mothers of the deceased were illiterate. 25% of fathers were labourer. Majority (37.5%) of the parents belonged to class IV socio-economic status. Overcrowding was present in about 83.3% of the families.

Table-1: Socio-demographic & environmental profile of deceased.

Sl. No	Traits	No. (n=24)	Percentage
1.	Type of family	Nuclear	17 70.8
		Joint	7 29.2
2.	Religion	Hindu	18 75.0
		Others	6 25.0
3.	Occupation:	Father:	
		Labourer/ Farmer	13 54.2
		Other	11 45.8
		Mother:	
		Labourer/ Farmer	3 12.5
		Others (Housewife)	21 87.5
4.	Socio economic status (Modified Prasad's Classification)	Upper (class – I)	2 08.3
		Upper middle (class-II)	4 16.7
		Lower middle (class-IV)	2 08.3
		Upper lower (class-IV)	9 37.5
		Lower (class-IV)	7 29.2
5.	Housing Condition	Kachcha	11 45.8
		Semi pukka/ Pukka	13 54.2
6.	Overcrowding	Present	20 83.3
		Absent	4 16.7
7.	Ventilation	Adequate	4 16.7
		Inadequate	20 83.3
8.	Mode of water supply	Tap water	9 37.5
		Hand pump	15 62.5
9.	Drainage system	Present (Open type)	24 100
		Absent	– –

Table-2 depicts that only 58.3% of the mothers had antenatal check-ups. 16.7% of the deliveries took place before 37 weeks. About 41.7% of the deliveries were

Verbal autopsy of neonatal deaths complicated and among them the main complication was excessive bleeding (80%).

Table- 2: Obstetrical history of the mother of the deceased

Sl. No	Traits	Number (n=24)	Percentage
1.	ANC received	Yes	14 58.3
		No	10 41.7
2.	T.T vaccination receive	Yes	16 66.7
		No	8 33.3
3.	Delivery ended	Early	4 16.7
		At time	18 75.0
		Late	– –
		Don't know	2 08.3
4.	Delivery status	Normal	14 58.3
		Complicated	10 41.7

Table-3 shows that about 29.2% of the births were still birth. 50% of the deliveries were conducted by untrained Dais. Majority (83.3%) of deliveries took place at home & unsterile blade was used in 25% of the cases to cut the cord.

Table- 3: Delivery profile of the mother of the deceased.

Sl. No	Traits	Number	Percentage
1.	Pregnancy outcome (n=24)	Live birth	17 70.8
		Still Birth	7 29.2
2.	Time that delivery took (n=24)	< 12	16 66.7
		>12	8 33.3
3.	Delivery conducted by:- (n=24)	Qualified doctor	2 8.3
		Nurse	3 12.5
		Trained dai	6 25.0
		Untrained dai	12 50.0
		Relatives/others	1 4.2
4.	Place of delivery (n=24)	Home	20 83.3
		Institutional	4 16.7
5.	Instrument used to cut the cord (n=24)	Blade	24 100.0
		Others	– –
6.	Sterilization of the instrument (n=24)	Done	18 75.0
		Not done	6 25.0
7.	Baby cried at birth (n=24)	Yes	17 70.8
		No	7 29.2
8.	Application on the cord (n=17)	Antiseptic/ Haldi	2 11.8
		Ash	1 5.9
		Nothing applied	14 82.3
9.	Dressing - cord & stump (n=17)	Clean with cotton	4 23.5
		No dressing	13 76.5

Table- 4: Profile of the deceased

Sl. No	Traits	Number	Percentage
1.	Presence of bruise/mark of injury at birth (n=24)		
	Yes	6	25.0
	No	18	75.0
2.	Size of the baby at the time of birth (n=24)		
	Normal Size	1	04.2
	Longer than usual	3	12.5
	About average	13	54.2
	Smaller than usual	3	12.5
	Very small	4	16.6
3.	Color of the baby at the time of birth (n=24)		
	Pale	5	20.8
	Blue	4	16.7
	Pink	15	62.5
4.	Birth weight of the baby (n=24)		
	Taken	4	16.7
	Not taken	20	83.3
	If taken then (n=4)		
	< 2.5 kg	3	75.0
	≥ 2.5 kg	1	25.0
4.	Type of feeding (n=17)		
	Exclusive breast feeding	9	52.9
	Partial breast feeding	2	11.8
	Total top feeding	6	35.3
5.	Colostrum given (n =17)		
	Yes	12	70.6
	No	5	29.4

Table- 5: Informations related to the deceased.

Sl. No	Traits	Number	Percentage
1.	Sex of the deceased (n=24)		
	Male	10	41.7
	Female	14	58.3
2.	Place of death (n=24)		
	Home	19	79.2
	Institutional	5	20.8
3.	Relationship of the informant to the deceased (n=24)		
	Father	5	20.8
	Mother	12	50.0
	Relative	7	29.2
4.	Age of the deceased (live birth) (n=17)		
	≤ 7 days	10	58.8
	> 7 to 28 days	07	41.2
5.	Duration of illness before death (n=17)		
	≤ 1 day	8	47.0
	> 1 day	9	53.0
6.	Health records & death certificates (n=17)		
	Present	3	17.6
	Absent	14	82.3
7.	Immediate cause of death as per verbal autopsy tool (n=17)		
	Birth asphyxia	1	5.9
	Birth injury	1	5.9
	Congenital abnormalities	1	11.8
	Diarrhoea	2	23.5
	Pneumonia	4	5.9
	Malnutrition	1	5.9
	Unknown fever (PUO)	1	5.9
	Fall from height	1	17.6
	Neonatal jaundice	3	5.9
	Twin pregnancy	1	5.9
	Others	1	5.9

Table-4 depicts that only one newborn was normal in size. Birth weight was taken in only 16.7% of the cases and among them 75% were low birth weight babies. About 20.8% of the newborns were pale at the time of birth. 35.5% of the newborns were on complete top feeding. Colostrum was not given in 29.4% of the cases. Breast feeding was started immediately after birth in only 11.8% of the newborns.

Table-5 depicts that 58.8% of the deceased were early neonates. Maximum deceased (58.3%) were females. Maximum deaths (79.2%) took place at home. Majority of the informants (50%) were mothers of the deceased. The cause of deaths found by means of verbal autopsies were mainly- pneumonia (23.5%), diarrhoea (11.8%) neonatal jaundice (17.6%), whereas birth asphyxia, birth injuries, congenital anomalies, malnutrition, pyrexia of unknown origin, fall from height, twin pregnancy and others contributed 5.9% each.

Discussion

Verbal autopsy tool

The verbal autopsy has been administered by research workers or experts to find out the feasibility and practicality of its use in various studies. In addition, in such studies, all deaths taking place in the study sample are likely to be covered; unlike in a routine system, where all deaths may not be registered and investigated. However, if one has to use the verbal autopsy as an instrument for ascertaining causes of death on a nationwide scale, it should be possible for health care providers at all levels to be able to use this tool, and should be incorporated along with the routine health systems¹.

Sensitivity & Specificity of the tool

In 1993, a verbal autopsy tool was developed for use in Comprehensive Rural Health Services Project Ballabgarh⁶. This tool had high sensitivity and specificity in both neonatal and post neonatal deaths⁷. Since 1999, it was decided that the health workers themselves should use the verbal autopsy for all under five deaths in their field practice area. This is being carried out as a part of routine activity and covers all the under-five deaths in the villages under the project area¹.

Main causes of neonatal deaths

Similar effort has also been tried in the present study to aid the local level health managers to set up the priority areas as per the findings of the verbal autopsy. In the present study it was found that the main causes of neonatal deaths were pneumonia (23.5%), neonatal jaundice (17.6%), diarrhoea (11.8%), birth asphyxia (5.9%), birth injuries (5.9%), congenital anomalies (5.9%), twin pregnancy (5.9%), etc., whereas a similar study reported birth asphyxia (18 %), prematurity (16 %), low birth weight/ small for date (14 %), septicemia (10 %), Congenital anomalies (8 %) and others

(34 %) as the causes of neonatal deaths as per verbal autopsy.⁽¹⁾ In our study, we found that prematurity was not an important precipitating factor for the cause of neonatal deaths as is the case in similar other Indian studies^{8, 9}. However, we found that pneumonia was the leading cause of death, which points to the quality of nursing and health care. Different results were observed in different studies and this may be due to the different areas, varied population and also varied environmental conditions.

Uses of Verbal Autopsy

We have seen that the verbal autopsy can be used for two purposes. Firstly, it can, help to give information for the health planners to look into the most common causes of the mortality and prioritize health services based on the mortality pattern of that area. In other words, verbal autopsy can be used for collecting information for action at all the levels. In fact this exercise was a part of an overall strategy to reduce IMR in the field practice area.

Conclusion

The important cause of neonatal deaths found by means of verbal autopsies were primarily - pneumonia, diarrhoea & neonatal jaundice; accounting together for about 53% of the total neonatal deaths. Verbal autopsy is the most feasible tool to be used by the health workers which is not only user friendly but also an easy method to ascertain the likely cause of neonatal deaths indeed.

Limitation of the study:

Only neonatal deaths were included.

Future scope of the study:

Such studies at a wider scale can be conducted in other regions also if adequate funds are allocated for the same.

Author's Contribution:

KM is responsible for designing, conduction of the study as principal investigator & manuscript write up, JVS is responsible for overall monitoring of the execution & coordination of the study & approval of the final manuscript and RS for data entry in Epi info statistical software and drawing up of inferences.

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Conflict of interest:

There is no conflict of interest among authors arising from the study.

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