Factors Involved in the Mortality of Infants under the Age of One Year in Bandar Abbas-Iran: A Document-Based Study

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Abstract

Background
The first year of life is of a great significance in promoting health and the quality of life. The present research aimed to determine the factors affecting the mortality of infants below the age of one year in Bandar Abbas, Iran.

Materials and Methods
The present retrospective research was conducted based on a questionnaire developed by the present researchers as well as the analysis of documents along with a phone interview. The data collection method was to review the files in the medical records of Bandar Abbas Children's Hospital in 2017. In case it was needed, visits were paid to the houses of the 342 infant participants who were under one year of age. The data entered SPSS 16.0 software.

Results
According to the present results, from 342 case (148 cases occurred in 2016 and 194 cases in 2015), 223 subjects (65.2%) had died during infancy and 119 subjects (34.8%) died between one month to one year of age. The highest frequency of death occurred within the first 7 days. The most important cause of infant death was sepsis and the primary cause of one month to one year children was preterm birth. Data analysis in the present study showed statistically significant relationship between the following variables and infant mortality: birth weight (p<.001), type of delivery (p=0.045), type of infant nutrition (p<0.001), and type of birth (p=0.002)

Conclusion
The most important cause of infant death was sepsis and the primary cause of one month to one year children was preterm birth. Special attention to infancy particularly preterm infants, advertise natural delivery, and early diagnosis of congenital anomalies, can help to cut down on the rate of infant mortality.

Key Words: Affective factors, Infant, Iran, Mortality.

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1- INTRODUCTION

Provision, maintenance and promotion of health among infants under the age of one year, as a vulnerable age group for medical services, is of a great significance. The first year of life is especially important for the establishment of health and promotion of the quality of life (1-5). The infant mortality rate (IMR) is the number of deaths of infants under one year old per 1,000 live births. This rate is often used as an indicator of the level of health in a country. The mortality rate of infants under the age of one year is a good indicator of the health state of the society. Not only does this statistical index shows the quantity and number of mortalities but also reflects the quality of life.

For the same reason, The United Nations Children's Fund is a United Nations (UNICEF) believes that the mortality rate of infants below one year is one of the most determining indices of development. According to the existing statistics, from among all the annual births in the world, more than 14 million die in the first year of life (6). In addition, more than 42% of infant mortality occurs in the age group of below 5 years and out of this number, about 80% of cases belong to the age group which is below one year old (7).

Caesarean section can increase the risk of neonatal death by four times the normal delivery. Among other problems, there are respiratory problems that are less than cesarean section in normal births (8). According to the World Health Organization (WHO) report in 2015 the mortality rate of infants below the age of one year in Iran was 13.5% (10% to 18.2%) cases per thousand live births (9, 10). According to the latest report of WHO in 2013, Iran had 42 cases of mortalities and ranked 57th as for the mortality rate of infants under the age of one year (11). Angola ranked first with 192 cases of mortality per thousand live births, while Hong Kung had the lowest rate of infant

mortality, i.e. 2.97 cases per thousand live births (12). Due to the different time and place of infant mortalities and the fact that no research has been conducted so far with this respect in Bandar Abbas city, the present study aimed to determine the causes of mortality among infants below one year of age. It hopes that the experts and authorities within this domain use this information to solve this problem and promote child health more than before.

2- MATERIALS AND METHODS

2-1. Research Design and Participants

The present descriptive-analytic research is retrospective and cross-sectional in type. The research population was comprised of all infants who died sometime from their birth up to the age of 12 months (11 months and 29 days) in the child hospital of the Bandar Abbas city, Iran, in 2015 and 2016. Inclusion criteria as follows: the age under one year, a complete and precise checklist for each deceased infant, death at the specific time span mentioned above and residence in Bandar Abbas city.

Exclusion criteria as follows: incomplete or defective checklist, non-native to the city (as a passenger, etc.), abandoned infant. Child hospital was selected to collect the data from because only this hospital was equipped with neonatal intensive care unit (NICU), and intensive care unit (ICU), and had the highest number of visits paid by sick children among all hospitals in Bandar Abbas city, Hormozgan province, South West of Iran.

Therefore, the highest number of mortalities (as the existing statistics showed) occurred in this hospital. From among the 422 cases of child mortality below the age of one year, 342 infants (82%) belonged to Bandar Abbas County; 148 cases occurred in 2016 and 194 cases in 2015 in this county. Therefore, the information obtained from this hospital

can be generalized to the whole city of Bandar Abbas city.

2-2. Instrument

The data collection instrument in this research was a questionnaire developed by the present researchers and designed in accordance with the purpose of the research. It was comprised of three sections. The first section as follow: Demographic information included such as parental education level, mother' job, monthly salary, place of residence, and parental smoking experience.

The second section as follows: mother's information and type of pregnancy (expected, unexpected), experience of abortion, experience of stillbirth, type of delivery, mother's age at the time of childbirth, frequency of delivery, blood relationship with husband, interval between the deliveries, reception of pregnancy care, mother's background disease, survival of the previous child, risk factors during pregnancy.

The third section as follows: infant's descriptive information including the type of infant's nutrition, delivery factor, infant's gender, birth weight, infant's congenital anomalies, age of death, birth age, type of birth (single or twin). The validity of the questionnaire was examined and confirmed by a panel of 5 theoretical experts and statisticians. To assess the validity of tools the content validity was used. Assessing the validity of the questionnaire was done through multi-item scale, including relevance, simplicity; clarity of the questions was examined. Therefore, all questions in the questionnaire were separately provided for 5 skilled professionals in field Pediatrician and to assess the content of the questionnaire the Lavsheh method was used. Content validity ratio (CVR) and content validity index (CVI) was calculated for each question and as for all the questions were more than acceptable value all the questions on the questionnaire, such as the question was not removed.

2-3. Procedures

The data collection method included a meticulous examination of infants' death files, phone interviews and face-to-face visits of the family if needed. The procedures consisted, firstly, of getting permission from the university deputy of research and then referring to the Information Technology (IT) center of the child hospital. Then, the researcher accessed the deceased infants' files in the target time span and extracted the required data from the hospital medical file center and examined the file of each deceased infant. Once all the required data were collected, 5 deceased infants who did not meet the inclusion criteria were omitted from the study. The data finally entered SPSS 16.0 to be analyzed both descriptively (via frequency and percentage) and inferentially (Chi-squared test). The p-value less than 0.05 were statistically significant.

3- RESULTS

The present research aimed to determine the factors affecting the mortality of infants under the age of one year in Bandar Abbas city, Iran. From the 342 infant participants (148 cases occurred in 2016 and 194 cases in 2015); 152 (44.4%) were female and 190 (55.6%) were male. The other variables included in the study of the causes of infant mortality are presented in **Table.1**. The distribution of the deceased infants in terms of their age at the time of death (death age) is indicated in **Table.2**. From the total number of infant mortality, 223 cases (65.2%) died as a neonate whereas 119 cases (34.8%) died between one month and one year of age. According to the present results, the highest frequency of mortality belonged to the first week of life. Moreover, from among the 223 cases of

mortality during infancy, 13% occurred in the first 24 hours of life; 50.6% occurred between 1 and 7 days of life and 36.32% occurred between 8 and 28 days. According to the present findings, the most prevalent causes of mortality were firstly preterm birth (n=75, 21.9%), and secondly sepsis (n=74, 21.6%). The other cases are reported in **Figure.1**. Data analysis in the present study showed statistically significant relationship between the following variables and infant mortality:

birth weight (p<0.001), type of delivery (p=0.045), type of infant nutrition (p<0.001), and type of birth (p=0.002) (**Table.3**). Moreover, statistically significant relationship was found between these variables and the cause of mortality: interval between the two deliveries (p=0.019), infant anomalies (p=0.019), father's education (p=0.045), and mother's education (p=0.033).

Table-1: Distribution of research variables related to the mortality of infants under the age of one year in Bandar Abbas, Iran (2015-2016).

Variables	Sub-group	Percentage (%)
Gender	Female	44.4
	Male	55.6
Mother's education	Uneducated	11.4
	Elementary or junior high school	59.6
	High school	19.9
	university	9.1
Father's education	Uneducated	11.1
	Elementary or junior high school	56.1
	High school	22.5
	university	10.3
Frequency of delivery	1	37.2
	2-4	55.8
	≤5	7
Experience of abortion	Yes	20.2
	No	79.8
Experience of stillbirth	Yes	7.9
	No	92.1
Place of residence	Urban	60.2
	Rural	39.8
Mother's age at the time of delivery (year)	<18	7.3
	18-35	84.8
	>35	7.9
Birth weight (gram)	<2500	69.3
	≥2500	30.7
Birth type	Singleton	87.7
	Twin or more	12.3

Table-2: Distribution of infants under the age of one year in terms of the birth age, Bandar Abbas, Iran (2015-2016).

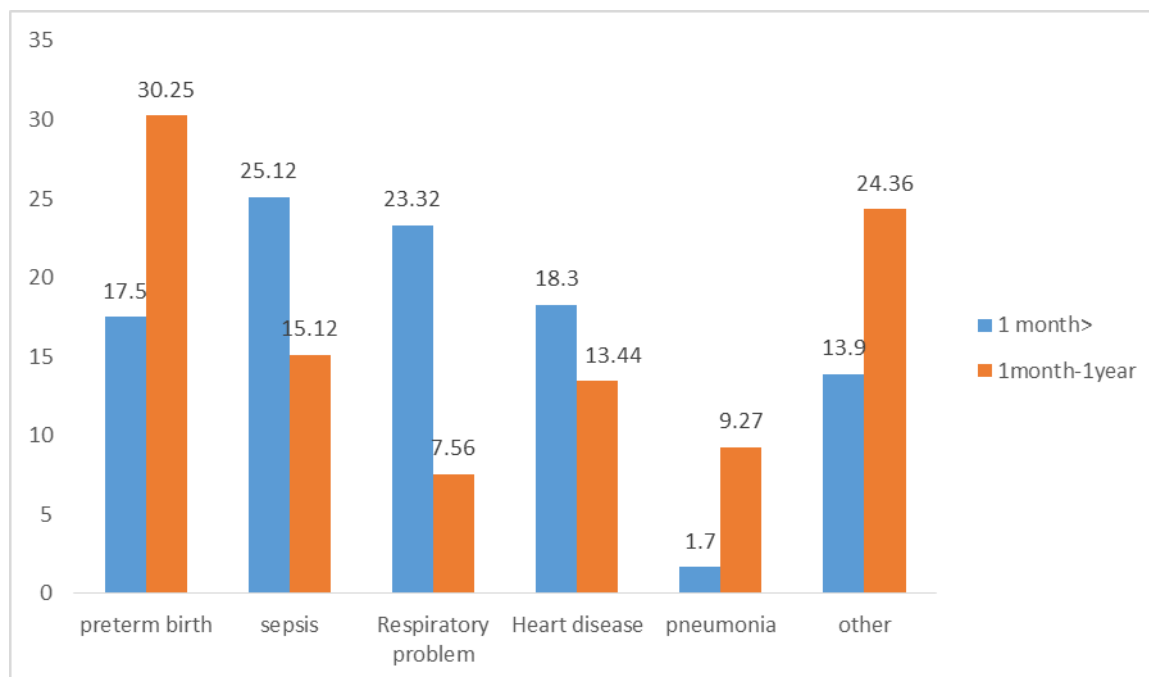| Birth age	Number.	Percentage (%)
< 24 hours	29	8.5
1-7 days	113	33
8-28 days	81	23.7
1-6 months	84	24.6
6 months to one year	35	10.2
Total	342	100

Fig.1: Distribution of the causes of infant mortality in terms of age in Bandar Abbas city, Iran (2015-2016).

Table-3: The relationship of the variables affecting infant mortality under the age of one year and the cause of mortality, Bandar Abbas, Iran (2015-2016).

Cause of mortality	Sub-group	Preterm birth Number (%)	Sepsis Number (%)	Respiratory problem Number (%)	Heart disease Number (%)	Pneumonia Number (%)	Other* Number (%)	P-value (Chi-squared test)
Birth weight, gram	>2500	44(18.6)	57(24.1)	59(24.9)	36(15.2)	8(3.4)	33(13.9)	<0.001
	< 2500	31(29.5)	17(16.2)	2(1.9)	21(20)	7(6.7)	27(25.7)	
Type of delivery	Cesarean section	29(17.6)	40(24.2)	39(23.6)	26(15.8)	3(1.8)	28(17)	0.045
	Vaginal in home	7(46.7)	4(26.7)	1(6.7)	2(13.3)	0(0)	1(6.7)	
	Vaginal in hospital	38(23.8)	30(18.8)	20(12.5)	29(18.1)	12(7.5)	31(19.4)	
Type of nutrition	Only breast milk	31(26.3)	14(17.5)	8(10)	16(20)	3(3.8)	18(22.5)	<0.001
	Only infant formula milk	5(14.7)	6(17.6)	2(5.9)	7(20.6)	2(5.9)	12(35.3)	
	Unfed	37(18.1)	51(25)	49(24)	33(16.2)	8(3.9)	26(12.7)	
	Breast milk + infant formula	12(50)	3(12.5)	2(8.3)	1(4.2)	2(8.3)	4(16.7)	
Type of birth	Singleton	71(23.7)	62(20.7)	43(14.3)	53(17.7)	14(4.7)	57(19)	0.002
	Twin or more	4(9.5)	12(28.6)	18(42.9)	4(9.5)	1(2.4)	3(7.1)	

*Congenital anomalies, meningitis and encephalitis, events and accidents and Malnutrition, etc.

4- DISCUSSION

The present research aimed to determine the factors affecting the mortality of infants under the age of one year in Bandar Abbas, Iran. In the present research, statistically significant relationship were found between birth weight, type of delivery, nutrition, the interval between two deliveries, child anomalies, preterm birth and parents' education (P<0.05). However, no statistically significant relationship were found between infant's gender, income of family, mother's background diseases, and parents' smoking. The findings revealed that 65.2% of cases had died during infancy (as a neonate); while 34.8% had died between one month toone year of age. The highest frequency of mortality occurred within the first 7 days of infants' life. These findings were consistent with Studyby Esmail Nasab et al. (6), Namakin and Sharifzadeh (13), Sharifi (14), Lawoyin (15), Zafari et al. (16), Mirza Rahim et al. (17) This shows the fact that despite the significant attention to the healthcare state; infants are still the most vulnerable pediatric age group.

Therefore, the sensitive age of infancy needs particular attention and through pre-birth care provision and recognition of the risk factors as well as the provision of special hospital care services, the mortality rate of infancy can be reduced. The main causes of infant mortality in this research were preterm birth, sepsis, respiratory problem, heart disease and pneumonia, respectively which is consistent with the findings reported by Namakin and Sharifzadeh (13), Sharifi (14), Aziz and Soomro (18), Nayeri et al. (19), Bijari and Niknafs (20), and Javanmardi et al. (21) that showed preterm birth and low birth weight among the main causes of neonatal mortality. According to the present findings, infant mortality due to the respiratory problems induced from preterm birth accounts for a high percentage of

child mortality. This proves the essentiality of preventing preterm birth and maintaining fetal health before birth as well as the pregnancy care provision. These mortalities are somehow controllable through preventive actios before, during and after birth (13). In this research, the second factor involved in child mortality was septicemia. During infancy especially among preterm infants, the prevalence of septicemia was higher than the term infants and the one-month to the one-year- old infants. However, in term infants, septicemia was also a key mortality factor. The present findings, similar to a body of research in other parts of Iran found septicemia and preterm birth as the most prevalent causes of mortality. Hamedi et al. reported the mortality induced by septicemia 20-40 percent (22). Boskabadi et al. reported septicemia among the main causes of preterm infant mortality (23). In order to reduce the rate of mortality caused by septicemia, the underlying causes should be sought for, including preterm birth, low Apgar, mother's age, the frequency of mother's deliveries and mother's urinary infections (24). A timely and accurate diagnosis of these factors can help to prevent the resultant infant mortality.

In the present research, a statistically significant relationship was found between birth weight and the causes of infant mortality. In the majority of previous investigations, birth weight has been considered as an effective risk factor of infant mortality (13). As low birth weight (LBW) is directly related with low socio-economic status, it seems that the following can help to reduce the rate of infant mortality: raising the quality of pregnancy health care especially pregnant mothers' nutrition plans, preventing preterm birth, changing social and familial socio-economic level, executing health education programs for high-risk groups especially pregnant women of low

education, primiparous women and those younger than the age of 18 or above 35 years old (25-27). The results of present study showed that a statistically significant relationship between parents' education and infant mortality that which was consistent with the findings reported by Davazdah Emami et al. (28), and Choe et al. (29). The results of an investigation by Groulee et al. on the mortality of 20 thousand infants younger than a year showed a strong relationship between breast feeding and the death of infants less than a year of age (30). Therefore, instructions before childbirth on breast feeding, correct execution of the rooming-in plan and supporting child-loving hospitals more than before can play a key role in promoting breastfeeding (31, 32).

4-1. Limitations of the study

Considering the fact that in this study the surviving infants were not compared with the information of the dead infants, the exact determination of the factors associated with death was not possible. The information is limited to the city of Bandar Abbas, and is not generalizable.

5- CONCLUSION

The present results revealed that the most prevalent cause of infant mortality was preterm birth and more than half of these mortalities occurred at neonatal age. Several factors showed to affect infant mortality including type of childbirth, type of nutrition, neonatal anomalies, short interval between childbirths and parents' education. These findings can help to recognize the effective factors in reduced infant mortality and make preventive interventions. There are a number of recommendations that can help to cut down on the rate of infant mortality: special attention of the medical staff to infancy particularly preterm infants, advertise natural delivery, early diagnosis of congenital anomalies for any preventive measure, awareness raising of parents

especially the young ones of the hazards of pregnancy care, high-risk pregnancies such as the short interval between two consecutive births, prenatal programs about the importance of breastfeeding and the accurate implementation of the mother and child common room. Prevention and control of these causes need to be considered by healthcare providers and policy-makers. It is therefore suggested that longitudinal research be conducted in this domain with a control group comprised of healthy infants to compare them to deceased neonates so as to find the effective factors involved in neonatal mortality.

6- CONFLICT OF INTEREST: None.

7- ACKNOWLEDGMENTS

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