CHILDREN MORTALITY RATE AND CAUSES OF DEATH IN AL-KADHIMIYA TEACHING HOSPITAL

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Abstract
Background: The reduction of under-five, and particularly infant, mortality to its biological minimum is regarded as a universally desirable goal. Specific targets for reducing the infant mortality rate have been set by many governments and international organizations.

Objectives: To identify the mortality rate and causes of death among the children admitted to Al-Kadhimiya Teaching Hospital throughout a 5 years period from Jan. 1997 to the end of Dec. 2001.

Methods: A retrospective study was done in AL-Kadhimiya Teaching Hospital. It included all the children died during the study period. The age range was since birth till 14 years of age. Information was obtained from reviewing the medical records including age, sex, and cause of death as documented in the death certificate. They were classified into 5 age groups.
Statistical analysis was done using chi square, any P value greater than 0.05 was regarded to be not significant.

Results: The over all mortality rate was 80 per 1000 hospital admissions. Male constituted 59.48% of deaths and female 40.52%.

The mortality rate increased from 75.97/1000 in 1997 to 83.27/1000 in 2001.
The leading causes of death were: In the neonatal period (29.08% of all deaths), sepsis (37.07%), prematurity (23.60%) and congenital anomalies (19.66%). In the infancy period (23.37% of all deaths), congenital anomalies (26.57%), pneumonia (21.68%), and sepsis (18.88%). In the age group 1-5 years (20.75% of all deaths), congenital anomalies (25.20%), diarrhea (20.47%) and pneumonia (17.32%). In the age group 6-10 years (15.68% of all deaths), malignancy (22.92%), congenital anomalies (21.88%) and diarrhea (20.83%). In the age group 11-14 years (11.12% of all deaths) malignancy (26.47%), congenital anomalies (22.07%) and diarrhea (19.12%).

Conclusion: Death in children below 5 years of age represents about 73.2% of total deaths. The average children mortality rate was 80 per 1000 which was more than that in 1997 (75.97 per 1000). The mortality rate among male children was more than that in female with a ratio of 1.5:1.

Introduction

Mortality rate expresses the incidence of death in a particular population during a period of time and is calculated by dividing the number of fatalities during that period by the total population. This can be expressed as either total mortality, or the number of deaths from a particular disease or event[1].
Assessment of the state of health of any community must begin with a description of the incidence of illness and must continue with studies that show the changes that occur with time and in response to program of prevention, case finding, therapy and adequate surveillance[2].

By pointing on the major problem we can plan to identify the causes underlying it in order to prevent, or improve the conditions that lead to it and this will lead to decrease in the mortality rate as shown in a study in USA which showed that death rates of children from all major causes declined in 1998; a large proportion of childhood deaths, however, continued to occur as a result of preventable injuries[3].
Children mortality rate also reflects the socio-economic status, environmental factors and health status of children in a specific country.
In our country two wars and sanction have shattered the Iraqi economy, setting back healthcare half a century[4]. We can classify the effect of these events in two main directions:
First: it affects the nutritional status of children and this will lead to increased incidence of malnutrition. It is well known that malnutrition impairs the immune systems of at least 100 million young children and several million

pregnant women, none of them infected by HIV. But unlike the situation with AIDS, the cure for immune deficiency due to malnutrition has been known for centuries[5].

Although malnutrition is rarely listed as the direct cause, it contributes to more than half of all children deaths. Malnutrition and infectious diseases are linked in downward spiral, each exacerbating the effect of the other and it is found that one in four children in the developing world suffers from malnutrition, as well as the misery of constant hunger, malnourished children are far more likely to succumb to infections[6]. At 1995 food and agriculture organization (FAO) report suggested that more than half a million Iraqi children may have died as a result of the sanction between 1991 and 1995[4].

Second: it increases the incidence of congenital anomalies and cancer in children. High numbers of children were born with cancer in the areas of Iraq where the Gulf War took place, this increased fears that the weapons used by the allies may be responsible. There are reports of children developing cancers at rates that doctors in the area have never seen before. Basra Children's Hospital experienced a death rate for children with leukemia 10 times higher than normal. The increase in cancers along with mutations and congenital abnormalities has been seen particularly in the areas which were desert battle field, the border towns between Iraq and Kuwait, which saw some of the heaviest fighting at the end of the Gulf War in 1991. One theory which was yet to be tested scientifically is that depleted uranium was used, thought to be dangerously radio active, and has found its way into the water supply[7].

Aim of the Study
To identify the mortality rate and causes of death among the children admitted to Al-Kadhimia Teaching Hospital during the study period.

Patients & Methods
A retrospective study was done in AL-kadhimiya Teaching Hospital included all children who died over five years period from Jan. 1997 to the end of Dec. 2001. Information was obtained from reviewing the medical records including age, sex, and cause of death as documented in the death certificate. The dead children were classified according to the following age groups: Neonatal period (1-28day old), infancy (1 month-1 year old), third group (1-5 years old), forth group (6-10 years old), and the fifth group (11-14 year old).

Statistical analysis was done using chi square and any P value greater than 0.05 was regarded to be not significant.

Results
During the five years period of the study (from Jan. 1997 to the end of Dec. 2001) the total number of children admitted to the hospital was 7650 and the results were:

1. -Total number of deaths during this period was 612, and the average children mortality rate was 80 per 1000 (Table 1). Also this table shows an increase in mortality rate from 75.97 per 1000 in 1997 to 83.27 per 1000 in 2001.

2. There was slight increase in mortality rate among male children (59.48%) than female (40.52%) and the ratio of male to female mortality rate was 1.5/1 (Table 1).

Table 1: Distribution of deaths according to the year and gender with mortality rate per year and per 1000

Year	No. of admission	No. of deaths male	No. of deaths female	Total no. of deaths/ year	Mortality rate/year
1997	1211	58(60%)	34(40%)	92	75.97
1998	1710	80(57.55%)	54(42.45%)	134	78.36
1999	1468	74(62.71%)	44(37.29%)	118	80.38
2000	1724	77(55%)	63(45%)	140	81.2
2001	1537	75(38.6%)	53(41.4%)	128	83.27
Total	7650	364(59.48%)	248(40.52%)	612	80

3. Death rate according to age groups was: (table 2).

* During neonatal period: total number of deaths was 178 (29.08% of total deaths).

* During infancy (1 month-1 year) total number of deaths was 143 (23.37% of the total deaths).

* In the age group (1 year-5 year) total number of deaths was 127 (20.75% of total deaths).

The total number of deaths in children below 5 years of age was 448 and it represents about 73.2% of total deaths.

* Total number of deaths in children 6-10 years old was 96 (15.68% of total deaths).

* In the age group (11 years-14 years) total number of deaths was 68 (11.12% of the total deaths).

Table 2: Distribution of deaths according to the age groups and

gender

Age group	No. of deaths male (%)	No. of deaths female (%)	Total no. of deaths (%)
0-28 days	106 (59.55%)	72(40.45%)	178(29.08%)
1 month-1 year	84(58.74%)	59(41.26%)	143(23.37%)
1-5 years	75(59.05%)	52(40.95%)	127(20.75%)
6-10 years	54(56.25%)	42(43.75%)	96(15.68%)
11-14 years	45(66.17%)	23(33.83%)	68(11.12%)
Total	364	248	612

X^2 0.983 P<0.02

4. During the neonatal period, sepsis (37.07%), prematurity (23.60%) and congenital anomalies (19.66%) were the leading causes of death and they comprised 80.33% of total deaths in this age group followed by pneumonia (11.24%), meningitis (6.74%) and other causes like kernicterus and birth trauma (1.69%) as show in (table 3).

Table 3: Causes of death in the neonatal period

Cause	No. of deaths male	No. of deaths female	Total no.	%
Sepsis	37	29	66	37.07
Prematurity	31	11	42	23.6
Congenital malformation	15	20	35	19.66
Pneumonia	13	7	20	11.24
Meningitis	7	5	12	6.74
Others	3	0	3	1.69
Total	106	72	178	100

X^2 = 15.57 P>0.001

5. During infancy congenital anomalies (26.57%), pneumonia (21.68%) and sepsis (18.88%) were the leading causes of death and they comprised (67.12%) of total deaths in this age group followed by meningitis (13.99%), diarrhea (9.09%), malignancy (6.99%) and other causes like Guillain-barre syndrome, liver failure and Kala-azar (2.80%) (table 4)

Table 4: Causes of death in the age group between 29 days-1 year

Cause	No. of deaths male	No. of deaths female	Total no.	%
Congenital malformation	23	15	38	26.57
Pneumonia	19	12	31	21.68
Sepsis	15	12	27	18.88
Meningitis	12	8	20	13.99
Diarrhea	7	6	13	9.09
Malignancy	5	5	10	6.99
Others	3	1	4	2.8
Total	84	59	143	100

X^2 = 3.254 P>0.05

6. In the age group (1-5) years old. Congenital anomalies (25.20%), diarrhea (20.47%) and pneumonia (17.32%) were the leading causes of death followed by malignancy (14.17%), meningitis (12.60%), sepsis (5.51%) and other

causes like hepatic failure and poisoning (4.73%), (Table 5).

Table 5: Causes of death in the age group 1-5 year

Cause	No. of deaths male	No. of deaths female	Total no.	%
Congenital anomalies	20	12	32	25.2
Diarrhea	10	16	26	20.47
Pneumonia	15	7	22	17.32
Malignancy	12	6	18	14.17
Meningitis	12	4	16	12.6
Sepsis	2	5	7	5.51
Others	4	2	6	4.73
Total	75	52	127	100

X^2 = 10.14 P>0.05

7. In the age group (6-10) years old the main causes of death were malignancy (22.92%), congenital anomalies (21.88%) and diarrhea (20.83%) followed by pneumonia (19.79%), meningitis (8.33%) and other causes like poisoning hepatic and renal failure (6.25%), (Table 6).

Table 6: Causes of death in the age group 6-10 years

Cause	No. of deaths male	No. of deaths female	Total no.	%
Malignancy	7	15	22	22.92
Congenital anomalies	9	12	21	21.88
Diarrhea	14	6	20	20.83
Pneumonia	13	6	19	19.79
Meningitis	6	2	8	8.33
Others	5	1	6	6.25
Total	54	52	96	100

X^2 = 16.62 P<0.01

8. In the age group (11-14) years old malignancy (26.47%), congenital anomalies (22.06%) and diarrhea (19.12%) were the leading causes of death followed by pneumonia (16.18%), meningitis (10.29%) and others causes like renal failure, heart failure (5.88%), (Table 7).

Table 7: Causes of death in the age group 11-14 years

Cause	No. of deaths male	No. of deaths female	Total no.	%
Malignancy	11	7	18	26.47
Congenital anomalies	10	5	15	22.06
Diarrhea	5	8	13	19.12
Pneumonia	9	2	11	16.18
Meningitis	6	1	7	10.29
Others	4	0	4	5.88
Total	45	23	68	100

X^2 9.31 P>0.05

Discussion

This study shows that the average children mortality rate for all age groups was 80 per 1000 which is much higher than that of developed countries like USA which was 7 and Russia

which was 17 and it is less than that of some African countries like Ethiopia 116[8].

This study shows an increase in the mortality rate from 75.97 per 1000 in 1997 to 83.27 per 1000 in 2001. This goes with the report of the WHO in 1998 which shows a similar increase in the mortality rate from 72 in 1990 to 122 in 1996 in the whole Iraq[9]. These results can be explained by serious shortage of essential health services and medicine requirements resulted in sharp increase in the mortality rate.

It was found that there is slight increase in the mortality rate in male (59.48%) than female (40.52%) and the ratio of male to female mortality rate was 1.5:1. This is not comparable to that found in other developing countries in which female infants experience higher death rates, but it is comparable to that found in developed countries in which male infants experience higher death rates than female. [10] This could be explained by increase in the incidence of RDS, pneumothorax, congenital anomalies and x-linked diseases in males, also male have approximately two folds higher incidence of sepsis than females[11].

The highest incidence of mortality rate was found in the neonatal period and it represents 29.08% of all deaths, this is because that the neonatal period is a highly critical time for an infant, who is completing many of the physiologic adjustments required for extra-uterine existence. In the United States, of all deaths occurring in the first year of life, two thirds are in the neonatal period[12].

The leading causes of death during this period were sepsis (37.07%) followed by prematurety (23.60%) and congenital anomalies (19.66%). This is different from the study done in Saudi Arabia by Asindi, who found that the major causes of neonatal death were prematurity, respiratory distress syndrome, congenital anomalies and lastly sepsis[13].

This increase in the incidence of sepsis in our hospitals is due to the shortage of medicines and change from one antibiotic to another according to the availability and poor medical supply which is attributed to the effect of embargo imposed on Iraq for more than II years.

During infancy congenital anomalies were the leading cause of death (26.57%) followed by pneumonia (21.68%), sepsis (18.88%), meningitis (13.99%) and diarrhea (9.09%).

These results were similar to those found in a study done in Syria by Nidal-Abu-Rashid, Samir AL-Jirf and Hyam Bashour which showed that in infancy congenital anomalies were the leading cause of death (24.2%) followed by pneumonia (19.5%) and diarrheal diseases (15.6%)[14].

The presence of any congenital anomaly increases the risk of mortality many folds compared to normal, even non lethal anomalies increase the mortality rate up to 8-9 folds[15].

In the age group 1-5 years, the study showed that congenital anomalies (25.20%) were the first leading cause of death, followed by diarrhea (20.47%); pneumonia (17.32%) and malignancy (14.17%). This result was similar to another study done in Baghdad (1998) by EL-Bayoumi which showed that the percentage of congenital anomalies increases in this age group by about 2.5 times[16]. While the WHO study showed that the congenital anomalies were the forth leading cause of death in this age group[9].

This increase in the incidence of congenital anomalies in this age group could be explained by the use of depleted uranium during the Gulf War in 1991 as an environmental predisposing factor.

In the age group 6-10 years it was found that the common cause of death was malignancy (22.92%), which is similar to that found in USA as cancer is still the chief cause of death in children aged 1-14 years[17].

Our hospital is not a centre for malignant diseases but in spite of that cancer was the leading cause of death in this age group, this increase in incidence of malignancy may be due to environmental pollution and uses of depleted uranium. It was found that radiation dose and the frequency of leukemia were related in a linear fashion, also leukemia developed quickly with a peak rate of occurrence 5 years after exposure[18].

The second leading cause of death in this age group was congenital anomalies (21.88%), while in USA it was the third leading cause of death in this age group[19].

The third leading cause of death was diarrhea (20.83%), followed by pneumonia (19.79%), meningitis (8.33%) and others like poisoning, hepatic and renal failure (6.25%). These results were statistically significant (P < 0.01) .

In the age group 11-14 years It was found that there was great similarity between this group and the previous one (6-10 years) where malignancy was the leading cause of death (26.47%), which is similar to that found in USA, but in spite of high incidence of malignancy in USA the survival rate improved specially children with acute lymphoblastic leukemia, largely owing to the decrease in relapses[20].

This study showed that infectious diseases like pneumonia, diarrhea and meningitis represent (45.59%) of total deaths in this age group, while in developed countries like USA the leading causes of death shifted from infectious to noninfectious diseases. In 1990, infectious respiratory diseases and diarrhea account for nearly a quarter of all deaths in USA, while in 1998 the leading causes of death were respectively, heart disease and cancer followed by stroke and chronic obstructive pulmonary disease[21].

The UNICEF report said that children are bearing the brunt of economic hardship in Iraq; and the number of malnourished children represents an increase of 72% since international sanction was imposed on Iraq[22].

Conclusion

1. Death in children below 5 years of age represents about 73.2% of total deaths.
2. The average children mortality rate was 80 per 1000.
3. The mortality rate increased from 75.97 per 1000 in 1997 to 83.27 per 1000 in 2001.
4. During the neonatal period, infection and prematurity were the leading cause of death.
5. Malignancy was a prominent cause of death in the older age groups.
6. The mortality rate among male children was more than that in female with a ratio 1.5/1.

Recommendations

1. Much more attention should be paid to maternal health services, many of the above mentioned causes of death especially in the neonatal period can be averted by implementation of adequate, prenatal and delivery care.
2. Encourage breast feeding in order to decrease frequency and severity of diarrheal diseases.
3. Improve the socioeconomic state of general population to decrease incidence of malnutrition and consequently improve the immunological state.
4. Proper use of antibiotics regarding the type, dose and duration is important for reducing infectious causes of death in children.

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