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Research Article

Impact of War on Children's Health in Aden, Yemen

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Abstract

Objective: The adverse effects of war on the health of children have been well documented. The aim of this study was to determine the prevalence of war related illness in children attending 22nd May General Hospital in Aden, Yemen.

Methods: This descriptive cross-sectional study was conducted on 1181 hospitalized children (697 (59%) males and 484 (41%) females) between the ages of 0 and 18 years during the war period April to August 2015. Refugee children are particularly vulnerable to the deadly combination of malnutrition, infectious illness and injuries.

Results: A total of 1181 children attended the hospital with a prevalence of 83.2% from the total 1419 studied population with a male to female ratio of 1.44:1 during April-August 2015. The number of children who attended the hospital were of higher frequency from Al Mansoora, Sheikh and Crater districts (37.9%, 14.7%, and 12.6% respectively) than the other districts.

The illnesses encountered in descending order were the respiratory infections (66%), gastroenteritis (12.5%), trauma (6.8%) and dengue fever (4.1%). The frequency of symptoms in highest proportion was fever (53.9 %), followed by cough (20%), trauma (6.8 %), vomiting (4.3%), diarrhea (2.9%). The proportion of children was higher in older age than smaller age for both sexes, with a statistically significance in males. Trauma was highest among the males in the age group > 5 years (70%) with respect to the other groups. Dengue fever was highest among the children in the age group > 5 years in both sexes with the majority of patients found in Crater and Lahej districts.

Conclusion: It is concluded that a higher proportion of the patients were male children of older age with high risk of the respiratory infections, gastroenteritis and trauma during war. This requires more attention to special emphasis on the high risk of awareness and the right to protect children during armed conflicts.

Keywords: *Health; Children; Aden*

Introduction

The adverse effects of war on the health of children have been well documented. The war causes injury, illness and breakdown in the structures that provide preventive, curative and ameliorative care [1].

Conditions for maintenance of child health deteriorate in war including nutrition, water safety, sanitation, housing, and access to health services. There may be loss of immunity to disease vectors with population movement. Refugee children are particularly vulnerable to the deadly combination of malnutrition and infectious illness. There is also interruption of population immunization programs by war which may be responsible for increases in child mortality [2].

Armed conflicts have changed in complexity and nature over the past few decades magnifying health challenges for children. It is estimated that over 1 billion children under the age of 18 live in areas affected by conflict, which is almost one-sixth of the world population (UNICEF April 2009). Three hundred million of these children were under the age of 5 years [3]. Children living in conflict-affected areas

are more likely to be poor, malnourished, and unhealthy (UNICEF April 2009). The average under-age-five mortality rate in conflict-affected countries is 81 per 1,000 live births, and this mortality rate is much greater compared to a world average of 72 deaths per 1,000 live births (UNICEF April 2009) [4].

A report from The Uppsala University Conflict Data Program (UCDP) database revealed that, Between 1990 and 2010 state based armed conflicts occurred in 72 of the 196 countries in the world (37%), Under 5 year mortality/1000 live births was 125 - 66 and infant mortality/1000 live births was 88 - 51 [5].

A recent civil war in Yemen in year 2015 happened that was internal with political crisis and civil conflict resulting in many complex emergencies. This civil fighting was complicated and resulted in the displacement of the population to overcrowded less troublesome districts that increased the likelihood of the spread of infectious diseases, famine and other specific problems for the children affected by the war.

Many hospitals and health centers were not functioning properly or were temporarily closed, making timely treatment increasingly difficult for parents to access. Other basic medical services including personnel and facilities were also destroyed. Furthermore the uptake of immunization by the children in Aden city was almost totally absent. In Aden, since the escalation of the conflict in March 2015, the number of children who were exposed to acute respiratory infections (ARIs) was likely to reach 1.3 million. Meanwhile, over 2.5 million children were at risk of diarrhea due to the unavailability of safe water supply, poor sanitary conditions and lack of access to oral rehydration salt (ORS) compared to 1.5 million prior to the conflict [6]. At least 279 children have been killed and 402 injured as a direct result of the conflict which escalated in late March [6].

The objective of the present study was to determine the prevalence of war-related illness and to identify some risk factors associated with war-related illness in a population of children attending 22nd May General Hospital in Aden city, Yemen.

Patients and Methods

The study comprised a cross-sectional hospital survey that included all the children who attended to the 22nd May General Hospital in Al Mansoora district, Aden governorate throughout the war period April to August 2015. The total number of patients was one thousand and four hundred and nineteen (1419) where children constituted one thousand and one hundred and eighty one (1181) with 697 males and 484 females. The children were between the ages of 0 and 18 years with a mean of 5.8 ± SD 4.4.

The required information of the children who attended the hospital during the study period comprised the history, physical examinations, laboratory and x-ray finding with the diagnoses of their diseases, including the acute respiratory infections, acute diarrhea according to WHO recommendations, trauma, dengue fever and malaria diseases, parasite, renal, hepatic diseases and others [7,8].

The studied variables included the age group in years (< 1 year, 1 - 5 years, > 5 years), sex (male and female), clinical manifestations (main symptoms and signs) of the children, residency of the children (Districts of Aden Governorate and Lahj Governorate) and the diagnoses of the diseases during the war period (April- August 2015). The data of variables were obtained from the out patients medical records of the children's 22nd May General Hospital.

The written consent was obtained from the administration office of the hospital and the objectives of the study were justified and the information collected was kept totally confidential. Data were processed and analyzed by the SPSS software version 15. The chi square test, with a significance level of 5% ($p < 0.05$), was used to determine the possible relationship between the diagnoses of the diseases and age groups, sex, clinical manifestations and residency.

Results

No. of Children (%)	Age-group (years)				Total	χ^2(p)
	< 1	1 - 5	> 5 - 18	> 18		
Females	41 (38.7)	223 (42.4)	220 (40.1)	102 (42.9)	586 (41.3)	
Males	65 (61.3)	303 (57.6)	329 (59.9)	136 (57.1)	833 (58.7)	
Total	106 (100)	526 (100)	549 (100)	238 (100)	1419 (100)	.832
Mean age (years)	0.582	2.768	9.903	32.378	10.158	

Table 1: *Distribution of the patients in 22nd May General Hospital by age-group and sex, in Aden, Yemen, 2015.*

No. of Children (%)	Age -group (years)			Total	χ^2 (p)
	< 1 year	1 - 5 year	> 5 years		
Females	41 (3.5)	223 (18.9)	220 (18.6)	484 (41)	
Males	65 (5.5)	303 (25.7)	329 (27.9)	697 (59)	
Total	106 (9)	526 (44.5)	549 (46.5)	1181 (100)	.767
Mean age	5.812, ± SD 4.39				

Table 2: *Distribution of the children in 22nd. May General Hospital by age groups and sex, in Aden, Yemen, 2015.*

The total number of studied populations in the out-patients of 22nd May General Hospital, Aden, during April -August 2015 were 1419, out of whom 1181 were children forming a prevalence of 83.2% from the total studied populations. There were [697 (59%) males and 484 (41%) females] with a male to female ratio of 1.44:1. Their age range was between 0 to 18 years (mean age 5.81 years, ± SD 4.4). A higher percentage of the children were between > 5 years comprising 549 (46.5%) and a lesser percentage were less than one year of age 106 (9%) of the children and 526 (44.5%) were between 1 - 5 years. Males (59%) predominated females (41%) in all group ages, although the difference was not statistically significant.

Table 3 shows the results of the clinical manifestations in 1181 children with the greatest proportion having fever (53.9 %), followed by cough (20%), (trauma) (6.8 %), vomiting (4.3%) and diarrhea (2.9%).

Clinical manifestations	No. of children (%)
Fever	637 (53.9)
Cough	236 (20)
Trauma	80 (6.8)
Vomiting	51 (4.3)
Abdominal pain	43 (3.6)
Diarrhea	34 (2.9)
Itching	28 (2.4)

Jaundice	26 (2.2)
Boils	24 (2.0)
Dyspnea	15 (1.3)
Dysuria	7 (0.6)
Total	1181 (100)

***Table 3**: Distribution of studied cases by clinical manifestations in 22nd May General Hospital in Aden, Yemen, 2015.*

Table 4 shows the results of the diagnoses of the diseases where the proportion of children with respiratory infections was the highest (66 %), followed by gastroenteritis, trauma and dengue fever (12.5%, 6.8% and 4.1% respectively).

Diagnosis of the Diseases	No. of children (%)
Respiratory infections	780 (66.0)
Gastroenteritis	148 (12.5%)
Trauma	80 (6.8)
Dengue fever	48 (4.1)
Skin infections	42 (3.6)
Blood diseases	27 (2.3%)
Renal diseases	21 (1.8%)
Parasitic diseases	14 (1.2%)
Hepatitis	12 (1.0)
Central nervous system (CNS) infections	7 (0.6%)
Malaria	2 (0.2)
Total	1181 (100)

***Table 4**: Distribution of studied cases according to diagnoses in 22nd May General Hospital in Aden, Yemen, 2015.*

Out of a total of 1181 children the prevalence of respiratory infections, gastroenteritis, blood diseases, skin infections in females were higher in the age group > 5 years and 1 - 5 years in comparison to < 1 year but the results were not statistically significant.

In males, the difference was statistically significant with the prevalence of respiratory infections, gastroenteritis, blood diseases, and skin infections that were higher in the age group > 5 years and 1 - 5 years with respect to < 1 year. Trauma was highest among the children in the age group > 5 years (70%) with respect to the other groups.

Dengue fever was highest among the children in the age group > 5 years in both sexes (females 56.5% versus males 72%) comparable to the other age groups.

The proportion of children with the final diagnoses of all the diseases was higher in older age than smaller age for both males and females.

No. of Children (%)		Age -group (years)			Total (100%)	χ^2 (p)
Females	Diagnosis	< 1	1 - 5	> 5		
	Respiratory infection	19 (5.9)	150 (46.6)	153 (47.5)	322	
	Gastroenteritis	16 (21.1)	35 (46.1)	25 (32.9)	76	
	Blood diseases	2 (15.4)	5 (38.5)	6 (46.2)	13	
	Skin infections	2 (10.5)	12 (63.2)	5 (26.3)	19	0.59
	Dengue fever	1 (4.3)	9 (39.1)	13 (56.5)	23	
	Malaria	0	0	2 (100)	2	
	Renal diseases	0	4 (36.4)	7 (63.6)	11	
	Trauma	1 (10)	4 (40)	5 (50)	10	
	CNS infections	0	1 (50)	1 (50)	2	
	Hepatitis	0	2 (66.7)	1 (33.3)	3	
	Parasitic diseases	0	1 (33.3)	2 (66.7)	3	
Total		41 (8.5)	223 (46.1)	220 (45.5)	484	
Males						
	Respiratory infections	44 (9.6)	217 (47.4)	197 (43)	458	
	Gastroenteritis	11 (15.3)	32 (44.4)	29 (40.3)	72	
	Blood diseases	2 (14.3)	5 (35.7)	7 (50)	14	
	Skin infections	3 (13)	9 (39.1)	11 (47.8)	23	
	Dengue fever	0	7 (28)	18 (72)	25	
	Renal diseases	0	5 (50)	5 (50)	10	
	Trauma	2 (2.9)	19 (27.1)	49 (70)	70	
	CNS infections	0	1 (200	4 (80)	5	
	Hepatitis	0	4 (44.4)	5 (55.6)	9	
	Parasitic diseases	3 (27.3)	4 (36.4)	4 (36.4)	11	003
Total		65 (9.3)	303 (43.5)	329 (47.2)	697	

Table 5: *Relationship between age group and the prevalence of diagnoses of the diseases in children by gender 22nd May General Hospital in Aden, Yemen, 2015.*

Diagnosis of diseases	Residency No (%)										χ^2(p)
	Mansora	Crater	Malla	Khor	Shiekh	Tawahi	Darsad	Bureka	Lahj	Total (100)	
Respiratory Infections	306 (39.2)	71 (9.1)	72 (9.2)	30 (3.8)	119 (15.3)	52 (6.7)	65 (8.3)	15 (1.9)	50 (6.4)	780	000
Gastroenteritis	46 (31.1)	18 (12.2)	14 (9.5)	4 (2.7)	27 (18.2)	17 (11.5)	12 (8.1)	1 (.7)	9b (6.1)	148	
Blood diseases	10 (37)	3 (11.1)	0	0	5 (18.5)	1 (3.7)	5 (18.5)	0	3 (11.1)	27	
Skin infection	24 (57.1)	4 (9.5)	4 (9.5)	1 (2.4)	4 (9.5)	1 (2.4)	3 (7.1)	0	1 (2.4)	42	
Dengue Fever	4 (8.5)	32 (66.7)	0	0	0	0	0	0	12 (25.0)	48	
Malaria	1 (50)	0	1 (50)	0	0	0	0	0	0	2	
Renal diseases	12 (57.1)	4 (19.1)	0	0	1 (4.8)	0	0	3 (14.3)	1 (4.8)	21	
Trauma	32 (40)	13 (16.3)	5 (6.3)	4 (5.0)	11 (13.8)	4 (50)	7 (8.8)	1 (1.3)	3 (3.8)	80	
CNS infections	0	4 (57.1)	0	0	1 (14.3)	0	2 (28.6)	0	0	7	
Hepatitis	5 (41.7)	0	1 (8.3)	0	1 (8.3)	0	4 (33.3)	0	1 (8.3)	12	
Parasitic diseases	8 (57.1)	0	0	0	5 (35.7)	1 (7.1)	0	0	0	14	
Total	448 (37.9)	149 (12.6)	97 (8.2)	39 (3.3)	174 (14.7)	76 (6.4)	98 (8.3)	20 (1.7)	80 (6.8)	1181	

Table 6: *Comparison of the prevalence of diagnoses diseases among children by residency in 22nd. May General Hospital in Aden, Yemen, 2015.*

A statistically significant relationship (p > 0.05) was observed between residency and the prevalence of the diagnoses of the diseases in the affected children. The prevalence of respiratory infections, gastroenteritis, blood diseases, skin infections, trauma, renal diseases, hepatitis, and parasitic diseases were comparably higher in Al Mansoora city (39.2%, 31.1%, 37%, 57.1%, 40%, 57.1% 41.7%, 57.1%) than in other districts. The greatest proportion of Dengue fever was found in Crater and Lahj (66.7%, 25%) than in the other districts.

Discussions

This study is directed to provide data about the impact of civil war on children's cope with the horrors of the war between people of Aden city and the military groups. It included children who attended 22nd May General Hospital. This hospital is one of the most important center, located in Al Mansoora district in Aden Governorate with a population of 114,931 according to 2004 census [9]. During the war because of the displacement of the population that increased two–three times than the usual, this hospital was providing services to patients coming mostly from Aden governorate and other nearby districts. During this critical conflict most of the government and private hospitals were closed [10].

A population of 1181 children [age range: 0 - 18 years (mean age 5.8 years, ± SD 4.389)] who attended 22nd May General Hospital were included in this study. There was no significant difference between the age group and gender. The children included in this study were found to be more common in 1 - 5 years and > 5 years groups [526 (44.5%), 549 (46.5%) respectively]. Males showed a higher predominance compared to females in all age groups (59% versus 41%) respectively. This falls in agreement with a study in Caroatea during 13-month period where215 children were wounded and 46 killed and over two-thirds of the children were boys. Children of both sexes over the age of 10 years were more likely to be killed or wounded than younger children [3].

This study showed the predominant frequent clinical manifestations were fever, cough, vomiting, diarrhea and trauma that falls comparably with the high prevalence of the common diseases of respiratory infections, followed by gastroenteritis, trauma and dengue fever. The districts that were highly affected included the residential areas of Al Mansoora, Sheikh and Crater district. This could be partially explained by the massive displacement of the population from Mualla, Tawahi, Cratar, Khor into Al Mansoora and Sheikh Othman.

Moreover, due to the poor standards of hygiene, health and nutrition that accompany war conditions, it increases the susceptibility of children to be at high risk for communicable and infectious diseases. Therefore, this study confirmed the fact of the adverse effects of war on the health of children which falls in agreement with many previous reports. Literature reports confirmed that the most common causes of diseases included diarrheal diseases, acute respiratory infections, measles, malaria and severe malnutrition [3].

UNICEF reported in April 2009, estimated that over 1 billion children under the age of 18 lived in areas affected by conflict, which was almost one-sixth of the world population. The principal conditions where a child's health is impacted by armed conflict is firstly through conflict-driven displacement which increases child's death and injury, mainly through increased susceptibility to infectious disease from unsanitary living conditions. Second, children have a higher risk of food insecurity and malnutrition during times of conflict [4].

A further study in Darfur (Sudan) revealed that, around 2 million people have been forced from their land and live in displacement camps. More than 1 million of them are children under 18, with 320,000 aged five and under [11].

This study showed a relationship between diagnoses of the diseases and age groups that was significant in male but not in females. In addition, the prevalence of respiratory infections, gastroenteritis, blood diseases, skin infections and trauma were higher in the age group > 5 years and 1 - 5 years with respect to the other group (Table 5).

In the present study, there was significant difference between diagnoses of the diseases and residency, revealing the prevalence of common diseases being respiratory infections, gastroenteritis and trauma that were comparably higher in Mansoora, Sheik and Aden district. The dengue fever was higher in Crater and Lahj, because in these two areas there was complete destruction of the water supplies, poor sanitation and unaffordable health systems. The inhabitants were forced to live in such bad sanitary conditions with the presence of the dead bodies together with the accumulations of sewage in the streets during the war [12]. A similar report at the Pediatric Department of the University Hospital Mostar during war 1993 and 1994 showed that the incidence of respiratory infections in children in war period was higher 230/1000 [13]. Another study in the Middle East in a number of hospitals showed that the rates of gastroenteritis among pediatric patients ranged from 38 to 91% [14].

On the other hand, a study by Public Health Office of Aden Governorate reported on 9 June 2016, over 4,080 cases of clinically diagnosed dengue fever between 1 April and 4 June, including 113 deaths. This included over 1,380 female and nearly 2,700 male cases. Over 37 per cent of them were children under 15 years. Of the 133 death, 64 were male and 49 were female. In addition to over 100 cases reported in Aden, nearly 650 cases have been reported in Hadramaut, 480 in Lahj, 220 in Shabwa and 50 in Taiz [12].

An alarming report from Yemen revealed that the health care system is on the verge of collapse due to persistent shortages of fuel and supplies, and ongoing insecurity. The continuous breakdown in water, sanitation and health systems poses a significant risk that communicable diseases will further spread [12].

In Aden city, eight health care facilities have been damaged or are inoperable. Ongoing shelling and clashes in some districts, as well as acute shortages of fuel and essential medicines have contributed to major gaps in health services. If further outbreaks should occur, the health system would face significant challenges in responding rapidly [12]. A study in Yemen revealed that at least 398 children were killed and 605 injured due to the ongoing conflict that escalated in March 2015. Children recruited or used in the conflict have more than doubled from 156 in 2014 to 377 so far verified in 2015. 15.2 million people lack access to basic health care, with 900 health facilities closed since March 26. 1.8 million children are likely to suffer from some form of malnutrition by the end of the year [10].

The prevalence of diagnoses of the diseases and trauma was higher in males in older age groups (1 - 5 years, > 5 years), because nearly 3,600 schools have closed down during the Yemen Conflict, that falls in agreement to a study in Carotea during 13-month period, over two-thirds of the children killed and wounded were boys. Children over the age of 10 years were more likely to be killed or wounded than younger children [3,10].

This could be explained by the fact that the male children in older age groups spend most of their time staying outdoors to play and watch the events as well as offering help to families within the war times makes them more vulnerable to the exposure of the communicable diseases and being traumatized. This has been attributed to the fact that the situation was particularly acute in heavily conflict affected governorates such as Aden, due to ongoing insecurity and access issues. Ambulance service in most of the areas was nonfunctional

due to fuel shortages and security threats to health workers and many affected people were unable to access health facilities [12,15]. Furthermore, acute respiratory infections, diarrheal diseases, vaccine-preventable and other infectious diseases continue to be the leading causes of morbidity, disability and mortality among children [15].

This study has several limitations. All the children in this study were outpatients in this hospital which was the single public center offering health care services. The majority of ill children were treated in their houses or private clinics. During the war period many children did not undergo intensive investigations. Thus, specific diseases might have been missed and we cannot state the number of sick children who received treatment in the hospital during the period of study. So the true prevalence might be somewhat higher than that reported here.

As we could not get detailed history of family and social events, we could not reveal the impact of the war in psychological and social changes that might had been affected. Children have the right to be protected from all forms of physical or mental violence, injury or abuse, neglect or negligent treatment, maltreatment or exploitation, including sexual abuse. Special emphasis is placed on the right to be protected during armed conflict [16].

It is recommended that children's issues should be systematically incorporated into all peace negotiations/accords and it should constitute a central component of post conflict programmers. Child protection should systematically be included in the mandates of all United Nations peace operations [15].

Conclusion

In this study there is a high prevalence of children in both sexes who attended the hospital below 18 years of age during the war period. This civil fighting was complicated and resulted in the displacement of the population to overcrowded less troublesome districts that increased the likelihood of the spread of infectious diseases, famine and the impact of the war in psychological and social changes that might had been affected.

In Aden, since the escalation of the conflict in March 2015, the number of children who were exposed to acute respiratory infections and risk of diarrhea due to the unavailability of safe water supply and poor sanitary conditions. It is of major importance for the need to perform further investigation to tailor the management of this global health problem.

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