

Epidemiological Study of Measles in Al- Kadhimiya Teaching Hospital

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ABSTRACT:

BACKGROUND:

Measles is a highly communicable disease caused by the measles virus. The disease is marked by prodromal fever, conjunctivitis, coryza, cough, and the pathognomonic koplik spots followed by an erythematous maculopapular rash. Infection confers lifelong immunity.

OBJECTIVE:

Find out the frequency of measles in the hospital admitted cases in children ≤ 12 years according to the vaccination and nutritional status, The causes of non-vaccination and the vaccine efficiency in preventing measles. The incidence of measles in the exclusively breast fed infants. The presenting signs and symptoms, commonest complications, investigations and the outcome.

PATIENTS AND METHODS:

A prospective study was performed from the 1st of January to the 1st of May in the year 2009, in Al-Kadhimiya Teaching Hospital. The data was collected through a questionnaire asked directly to the parents, and all the patients were systemically examined and followed up clinically until they discharged home or unfortunately died. The collected data was analyzed and adjusted using the SPSS version 10 statistical programs.

RESULTS:

The incidence of measles was (44.29 %). Most of cases were living in crowded houses, all patients had positive history of contact, mostly during a visit to a medical health facility (49.3 %). All age groups were affected by measles, mostly in the 1st (27 %) and the 2nd (19 %) years of life. Higher incidence was reported in males (53.5 %). Most of the cases were non-vaccinated (86.25 %) with non-vaccinated mothers as well (85.25 %). Nineteen percent of the cases were malnourished. The incidence was lowest in the exclusively breast fed infants (1.5 %).

Measles mostly presented with fever for ≥ 3 days (100 %), rash (100 %) and conjunctivitis (98.25 %). The commonest complications were pneumonia (62.75 %), diarrhea (40.25 %). The majority of patients who had developed convulsions had normal CSF analysis results (76.7 %). CXR reported pneumonic consolidation in (62.75 %) of the patients. Ninety percent of cases were discharged home and (10 %) died.

CONCLUSION:

Measles is higher in the crowded places, in infants and toddlers, in males, in the non-vaccinated, and less in the exclusively breast fed infants. It is more severe in the malnourished patients. Vaccination is the most important preventive measure against measles.

Measles mostly present with fever, maculopapular rash, and conjunctivitis, with the most common complications are pneumonia, diarrhea, and encephalitis.

The disease usually has no or little effect on the blood counts and CSF analyses, and CXR document pneumonic consolidation in the majority of cases.

Measles is still a serious disease with high fatality rate.

KEY WORDS :measles, epidemiology, vaccination.

INTRODUCTION:

Measles is a highly communicable acute disease caused by measles virus. It is also

known as rubeola and is marked by prodromal fever, conjunctivitis, coryza, cough, and pathognomonic Koplik spots, followed by an erythematous maculopapular rash on the 3rd to 7th day. Infection confers life-long immunity. ⁽¹⁾

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Despite the availability of an effective vaccine, the measles virus still affects 50 million people annually and causes more than 1 million deaths.

The highest incidence of measles and its associated morbidity and mortality is observed in developing countries. However, it still occurs infrequently in the industrialized nations. (2)

The resurgence of measles was attributed to vaccine failure in a small number of school-aged children and low coverage of preschool-aged children and because of more rapid waning of maternal antibodies in infants born to mothers who never experienced wild-type measles infection. Implementation of the 2 dose vaccine policy and more intensive immunization strategies resulted in interruption of endemic transmission. (3)

Infection with measles has no race predilection. Prevalence is linked to inadequate vaccination in developing countries. Measles infection has no sex predilection. Historically, measles is a disease of childhood and continues to affect children in developing countries. In industrialized nations, infection is seen in unvaccinated individuals of any age or those with waned immunity. (2)

The portal of entry of measles virus is through the respiratory tract or conjunctivae following contact with droplet aerosols in which the virus is suspended. Secondary cases have been reported in physicians' offices and in hospitals by spread of aerosolized virus.

The diagnosis of measles is almost always based on clinical and epidemiologic findings. (3)

Positive contact with other patients known to have measles adds strong epidemiological evidence to the diagnosis. (1)

Complications of measles are largely attributable to the pathogenic effects of the virus on the respiratory tract and immune system. (3)

Complications with measles are relatively common, ranging from relatively mild and less serious diarrhea, to pneumonia, encephalitis, and corneal ulceration leading to corneal scarring. Complications are usually more severe amongst adults who catch the virus. (1) Morbidity and mortality from measles are greatest in patients <5 y of age (especially <1 y of age) and those >20 y of age. In developing

countries, higher case-fatality rates have been associated with crowding, which is possibly attributable to a larger inoculum dose following household exposure. Severe malnutrition in children results in suboptimal immune response and higher morbidity and mortality with measles infection, with fatality rates reaching as high as 28%. (4)

Pneumonia is the most common cause of death in measles. Diarrhea and vomiting are common symptoms associated with acute measles. (4)

Encephalitis following measles has been a long-associated complication, often with an unfavorable outcome. Findings in cerebrospinal fluid include lymphocytic pleocytosis in 85 % and elevated protein concentration. (1)

Management of measles is supportive. Antiviral therapy is not effective in the treatment of measles in otherwise normal patients. (1)

With improvements in health care, better nutrition, and decreased crowding, the death to case ratio fell to 1 per 1,000 cases. Pneumonia and encephalitis were complications in most of the fatal cases, and immunodeficiency conditions were identified in 14–16 % of deaths. (4)

In developing countries where measles is highly endemic, the WHO recommend that two doses of vaccine be given at six months and at nine months of age.

More than 99 % of children who receive 2 doses of the vaccine at least 1 month apart and after 12 months develop an appropriate response. Protective titers can last as long as 16 years. (5)

PATIENTS AND METHODS:

A prospective study was performed on admitted cases of measles (400 cases) at pediatric ward in Al-Kadhimiya Teaching Hospital from the 1st of January to the 1st of May 2009.

The data was collected through a questionnaire asked directly to the parents include: Age and sex, Address, crowding, Type of feeding, History of contact with a case of measles, Main clinical manifestations, Vaccination history, Causes of non-vaccination. Vaccination history for the mothers, Age of the mothers and their education status.

All the admitted patients were systemically

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examined and the following investigations were performed for the patients: HB level, WBCs count, and platelets count (for all patients). Plain chest radiographs (for all patients). Lumbar puncture and CSF analysis for the patients with disturbed level of consciousness and convulsions.

All the patients were followed up clinically until they discharged home or unfortunately died.

The collected data was analyzed and adjusted using the SPSS version 10 statistical programs.

RESULTS:

The number of measles cases admitted during the period of study in the pediatric ward in Al-Kadhimiya Teaching Hospital was 400 cases out of 902 total admitted cases (for all causes) gave an admission rate of (44.29 %).

Most of the patients were living in crowded houses in Baghdad like Al-Shuala (98 cases / 24.5 %), Al-Tajee (85 cases / 21.25 %), and Al-Hurria (49 cases / 12.25 %).

Positive contact history was found in all of the cases and mostly the patients were exposed to measles infection when they had a visit to a medical health institution (within 8–12 days before the onset of rash) like hospitals, primary care health centers, or private clinics. These are shown in table (1).

All age groups were affected by measles (the youngest age was 17 days and up to 12 year old) including 2 neonates (0.5 %) 17 days, and 20 days of age respectively. The highest incidence was found in the 1st year of life (108 cases / 27 %). High rate of the disease found in those who were ≤ 9 months of age (82 cases / 20.5 %) which is the recommended age for measles vaccination, and in ≤ 15 months of age (120 cases / 30 %) which is the recommended age for MMR vaccination in Iraq. The incidence in ≤ 2 years of age was (76 cases / 46 %). Those who were ≤ 5 years of age had represented the vast majority of cases (336 cases / 84 %). The median age of patients was 2.5 years. These are all shown in table (2).

Table 1: Distribution of the study group according to the contact history.

Contact history	No.	Percentage %
A visit to a medical health facility	197	49.25
Living in an endemic area	183	45.75
A visit to an endemic area	20	5.0
Total	400	100

Table 2: The age distribution of the measles cases.

Age group	No.	Percentage %
0 – 3 m	12	3.0
> 3 m – 6 m	31	7.75
> 6 m – 9 m	39	9.75
> 9 m – 1 yr	26	6.50
> 1 yr – 2 yr	76	19.0
> 2 yr – 3 yr	61	15.25
> 3 yr – 4 yr	48	12.0
> 4 yr – 5 yr	43	10.75
> 5 yr – 6 yr	20	5.0
> 6 yr – 7 yr	13	3.25
> 7 yr – 8 yr	9	2.25
> 8 yr – 9 yr	6	1.5
> 9 yr – 10 yr	11	2.75
> 10 yr – 11 yr	2	0.5
> 11 yr – 12 yr	3	0.75
Total	400	100

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The incidence of measles was more in males (214 cases / 53.5 %) than females (186 cases / 46.5 %) in this study with a male: female ratio of 1.1:1.

The disease occur more in non-vaccinated patients (264 cases / 66 %), and in infants less than 9 months of age who were not yet in the age of measles vaccination (81 cases / 20.25 %) gave a total of (345 cases / 86.25 %) were non-vaccinated. Only 55 cases (13.75 %) were

vaccinated, 46 cases (11.5 %) had received measles vaccine only given one dose vaccine efficiency (VE) of (88.5 %) and 9 cases (2.25 %) had received measles and MMR vaccines gave a two doses vaccine efficiency of (97.75 %).

The majority of the mothers were also non-vaccinated (265 cases / 66.25 %) or do not know their vaccination status (76 cases / 19 %). These findings are shown in table (3).

Table 3: Vaccination status of measles for the patients and their mothers, with one and two doses-vaccine efficiencies in patients.

Vaccination status		No.	Percentage (%)	VE (%)
Patient	Measles vaccine only	46	11.5	88.5
	Measles and MMR vaccines	9	2.25	97.75
	Not vaccinated	264	66.0	
	Not in the age of vaccination	81	20.25	
	Total	400	100	
Mother	Vaccinated	59	14.75	
	Not vaccinated	265	66.25	
	Do not know her vaccination status	76	19.0	
	Total	400	100	

The causes of non-vaccination were reported by the parents with the most common cause was intercurrent illness during the time of

vaccination (104 cases out of 345 total non-vaccinated patients / 30.2 %). Other causes of non-vaccination are shown in table [4].

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Table 4: The causes of non-vaccination.

The cause of non-vaccination		No. (% From the non-vaccinated)
Intercurrent illness during vaccination time	No. (% From the non-vaccinated)	104 (30.2)
Fear of side effects and familial distrust of the safety of vaccines	No. (% From the non-vaccinated)	90 (26.1)
Not yet in the age of measles vaccination	No. (% From the non-vaccinated)	81 (23.5)
Forced migration to another living areas	No. (% From the non-vaccinated)	30 (8.7)
The father of child didn't allow vaccination	No. (% From the non-vaccinated)	25 (7.3)
The immunization center was located too far from Home	No. (% From the non-vaccinated)	5 (1.4)
Having no knowledge about vaccination	No. (% From the non-vaccinated)	5 (1.4)
The mothers could not give any reason for non-Vaccination	No. (% From the non-vaccinated)	5 (1.4)
Total	No. (% From the non-vaccinated)	345 (100)

Seventy-six cases (19 %) were malnourished according to their age and growth parameters. According to the type of feeding, the lowest incidence of measles was found in those infants who were exclusively breast feeders (6 cases /1.5 %) and the highest incidence found in those who were consuming solid food (227 cases / 56.7 %) or solid food with bottle feeding (76 cases / 19 %). bottle feeding(43/10.8%), mixed feeding(16/4%),breast & food (32/8%)

The most common presenting signs and symptoms of measles were fever for ≥ 3 days duration (400 cases / 100 %), maculopapular

rash (400 cases / 100 %), conjunctivitis (393 cases / 98.25 %), Cough (344cases/86.0%), Coryza (260 cases/ 65%), Splenomegally (18 cases/ 4.5%), Koplik spots (17 cases/ 4.25%), Hepatomegally (15 cases/3.75%) and Cervical lymphadenopathy (8 cases /2%).

The most common complications of measles encountered in our studied sample were pneumonia (251 cases / 62.75 %), diarrhea with or without dehydration (161 cases / 40.24 %), encephalitis (28 cases / 7 %, most of these cases were referred from another hospitals for intensive care unit), and croup (22 cases / 5.5 %). All of the complications are shown in table [5].

Table 5: Common complications identified in the studied sample.

System	Complication	No.	Percentage %
Respiratory	1. Pneumonia	251	62.75
	2. Croup	22	5.5
	3. Otitis media	16	4
Gastrointestinal	Diarrhea ± dehydration	161	40.25
CNS	1. Encephalitis	28	7.0
	2. Convulsions	20	5.0

The majority of children have had normal blood counts (87.5 % for Hb level, 77.5 % for WBCs count, and 93.5 % for platelets count). Anemia was reported in 50 cases (12.5 %). Also there were asymptomatic leucopenia in 50 cases (12.5 %) and thrombocytopenia in 25 cases (6.25 %). CSF analysis was normal in most of the patients who had this test done (23 cases out of 30 total cases / 76.7 %) and it was abnormal (lymphocytic pleocytosis and / or high protein level) in few cases (7 cases out of 30 total cases / 23.3 %), which means that only

7 cases out of 400 total admitted cases had abnormal CSF results (1.75 %).

Regarding CXR, most of the cases have had pneumonic consolidation (251 cases / 62.75 %) or just hyperinflation (120 cases / 30 %), and it was normal in 29 cases only (7.25 %).

The majority of cases (360 cases / 90 %) had survived and discharged home while 40 cases (10 %) had died, most frequently due to pneumonia (26 out of 40 total died cases / 65 % of total death) and encephalitis (14 out of 40 total died cases / 35 % of total death)

Table 6: Fate of the studied sample.

Discharged home		No. (% From total cases) { Death rate in that group }	360 (90.0) { 0 }	
Death	Pneumonia	No. (% From total cases) { Death rate in that group }	26 (6.5) { 10.1 }	% From total death 65
	Encephalitis	No. (% From total cases) { Death rate in that group }	14 (3.5)) { 50 % }	35
	Total death	No. (% From total cases)	40 (10)	100

DISCUSSION:

The admission of measles cases in the pediatrics ward in Al-Kadhimiya teaching hospitals during the period of study was (44.29 %) among all admitted cases. Nearly the same frequency was reported by other studies (6,7,8,9,10).

The incidence of measles was higher in the more crowded towns which was the same shown by many studies (6,11,12).

A visit to a medical health facility within 8–12 days before the onset of rash was the only source of contact in about 50 % of patients during the outbreak.

Several studies reported this source as the cause of the disease in different parts of the world. (13,14,15,16).

The highest incidence of measles was in those patients who were ≤ 5 years of age (84 %). It was (46 %) for ≤ 2 years, (30 %) for ≤ 15 months, (27 %) for ≤ 1 year,

Comparable studies show the incidence of measles in our study with other studies in different age groups in different parts of the world (6,8, 12, 13,15, 16, 17, 18, 19, 20, 21, 22, 23).

Higher incidence reported in males (53.5 %) than in females (46.5 %) in this study, with a male : female ratio of 1.1 : 1. Similar ratio reported by other studies (6, 9,18, 21, 24).

Clearly the highest incidence of measles was reported in the non-vaccinated children (86.25 %), and the incidence was (11.5 %) for those who had received measles vaccine only leading to a one dose vaccine efficiency of (88.5 %), while the incidence of measles was only (2.25 %) in patients who had received both measles and MMR vaccines leading to 2 doses vaccine efficiency of (97.75 %).

The incidence of measles according to the vaccination status and vaccine efficiency in some countries in the last 20 years were shown in several studies (7,8,15, 22, 24, 25,26, 27, 28, 29,30) which show comparable results.

High percentage of mothers were non-vaccinated (66.25 %), or do not know their vaccination status (19%) Other studies regarding vaccination status of the mother which show the non vaccination of the mothers (15,31).

The commonest cause of non-vaccination was Intercurrent illness during the vaccination time (30.2 %). Similar result shown by a study (32) while fear from vaccination side effect reported by others (33), others show the family distrust of vaccination (34), other different

causes for non vaccination (35)

The incidence of malnutrition was (19%) in our studied sample. Other studies show higher incidence (11, 24, 27)

Exclusively breast fed infants reported the lowest incidence of measles in our study (1.5 %). This may suggest a protective effect of breast feeding which need to be proved by laboratory or other more sophisticated techniques.

This was only reported by a study who claimed that exclusive breast feeding for > 3 months was negatively associated with the diagnosis of measles. (36)

Measles cases were mostly presented with fever for ≥ 3 days (100 %), maculopapular rash (100 %), conjunctivitis (98.25 %), cough (86 %) and coryza (65 %). comparable results for presentations of the disease were shown by other studies (6,19, 21, 37)

The commonest complication of measles reported in this study was pneumonia with an incidence of (62.75 %) followed by diarrhea (40.25 %), encephalitis (7 %) and croup (5.5 %). A study show the commonest complication (23 %) was pneumonia, and (3 %) for encephalitis. (7)

Other study reported the commonest complication was diarrhea in 79 % followed by pneumonia in 47 % and croup in 32 % of cases. (9)

An incidence of 82 % for pneumonia and croup together and 12 % for diarrhea. (12)

Others reported that pneumonia presented in 11.5 % and encephalitis in 2.7 % of cases. (17)

A study show the commonest was pneumonia with an incidence of 55.7 %. (21,27).

Other study show the incidence as 39.7 % for pneumonia, 38.2 % for diarrhea, and 5.1 % for encephalitis. (24)

Measles mostly had little effects on the blood counts of patients, were the majority of patients had normal blood counts (87.5 % for Hb level, 77.5 % for WBCs count, and 93.5 % for platelets count). Anemia and leucopenia were reported in (12.5 %) and thrombocytopenia in (6.25 %). Normal blood counts were reported by other studies (6,8,12, 19, 38).

CSF analyses was normal in (76.7 %) and it was abnormal in (23.3 %) of the patients who had developed convulsions or disturbed level of consciousness. Only (1.75 %) from the total cases had abnormal CSF results. Nearly the same results

were reported by^(7,17, 27)

Regarding CXR, most of the patients (62.75 %) have had pneumonic consolidation.

The incidence of pneumonia as diagnosed by CXR was reported in other studies^(9,12, 27).

The mortality was (10 %) in our study. This is still high and attributed mainly to malnutrition and fatal complications especially in the non-vaccinated patients.

Comparable results found in^(7,3,18, 20 28, 37, 39).

CONCLUSION:

Crowding and health institutions play an important role in the spread of the disease, especially when there are improper isolation techniques.

Vaccination is the most important and readily available preventive measure against measles.

The disease occurs more in infants and toddlers than in other age groups, more in males than in females, and more in the non-vaccinated than in the vaccinated patients.

The disease is more severe in the malnourished patients.

Exclusive breast feeding is associated with a lower incidence of measles.

Pneumonia is the most frequent complication of measles and encephalitis is the most lethal complication.

The disease usually has no or little effect on the blood counts and CSF analysis, and CXR document pneumonic consolidation in the majority of cases.

Measles is still a serious disease with high fatality rates.

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