Severity of Measles: a Study at the Queen Sirikit National Institute of Child Health

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Introduction : *Thousands of measles cases are reported annually in Thailand even though measles vaccine has been introduced in the expanded program of immunization for every 9-month-old infant for nearly 20 years. Severe cases are admitted to the hospital, usually with complications, some cases lead to death.*
Objectives : *To study the clinical presentations of severe cases of measles and its complications and find the correlations of severity of pneumonia with age, nutritional status and history of vaccination.*
Material and Method : *The hospital charts of measles patients admitted to the Queen Sirikit National Institute of Child Health (QSNICH) during 1998-2002 were retrospectively reviewed. Demographic data, history including history of measles vaccination, physical examinations, laboratory investigations, treatment and hospital course which were relevant were recorded. Paired t-test and Pearson's correlation were used for data analysis.*
Results : *There were 156 cases of measles admitted to the QSNICH. There were 95 boys and 61 girls and the male to female ratio was 1.56:1. The age range was 2 months to 14.8 years, median = 1.5 years, mode 8 months. Fifty-nine percent of the cases were under 2 years of age; 40% under one year and 23.9% were under 9 months. About 44% of the cases had one dose of previous measles vaccination, no history of measles vaccination in 91.4% of cases whose age was under 1 year in contrast to 80% of cases over 5 years that had a history of measles vaccination. Sixty-six percent of the cases had normal nutritional status while 12.4%, 4.8% and 2.1% had mild, moderate and severe protein calorie malnutrition. Fourteen cases (9%) had underlying diseases. At least 3 of the classical signs and symptoms of measles (rash, cough and coryza) were found in 92.3% of the cases. The mean duration of fever at the time of admission was 5.3 days. The common complications in admitted measles cases were pneumonia (62.2%) and diarrhea (38.1%). The likely causes of pneumonitis were measles viruses (52.6%) and bacteria (47.4%). There was one dead case with severe pneumonia, with ARDS and respiratory failure. Young infants had a higher incidence of diarrhea with dehydration ($p = 0.000$) but severity of pneumonia was not different from older children ($p = 0.512$). The severity of pneumonia was not correlated with the age ($r = 0.087$), nutritional status ($r = 0122$) or the history of receiving measles vaccine ($r = 0.116$).*
Conclusion : *Measles is one of the important diseases of in-patients admitted to the QSNICH, because of the severity of the diseases due to pneumonia and diarrhea. One severe case died because of severe pneumonia that lead to ARDS and respiratory failure. Young infants had a higher incidence of diarrhea and dehydration, while there was no correlation between severe pneumonia with age, nutritional status and history of vaccination.*

Keywords : *Measles severity, Complications, Nutritional status, Measles vaccine*

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Measles is the most frequent cause of vaccine-preventable childhood deaths[1] and it is still widespread in developing countries despite achieving and sustaining global measles vaccination coverage of about 80% over the past decade[2]. WHO Global Burden of Diseases 2000 Project has ranked measles as the 5th most common cause of death in children under 5 years old, which is 5.4% of all deaths in this age group. In the year 2000, the global annual

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incidence was estimated to be 39.9 million cases with 777,000 deaths and 28 million disability-adjusted life years[3,4]. The case fatality rate (CFR) ranges from 0.1-15%[5, 6].

In Thailand, the trend of measles morbidity is decreasing but is still high in children in the under-5 and 5-9 year age group[5]. The incidence is quite high compared to the estimated vaccine coverage (in 9-12 months old infants) of about 94-98%[6]. This may be due to less vaccine coverage in the older age group[6], vaccine failure[8,9], or waning of immunity in older children[6,10], primary or secondary measles vaccine failure[8,10].

Measles, without complication, runs a severe clinical course for at least 7-10 days, the affected children can become very ill and need hospitalization. But complications are found in a high percentage of measles cases, that make the disease more severe and need more hospitalization and longer stay in hospital. At the Queen Sirikit National Institute of Child Health (QSNICH), about 500 to 600 cases of measles were seen annually before the introduction of measles vaccine to the EPI programe in Thailand and about 25% were more severe cases that needed admission. The annual measles cases seen at the QSNICH have decreased to 150-300 cases annually since the late 90s[5].

Measles is not just another viral exanthem, it runs a severe course even in prosperous countries[2], and leads to severe complications and death. The case fatality rate of measles in Thailand are 0.5/100,000 population[5]. The morbidity of measles in BKK reported by the section of Epidemiology of the Bangkok Meropolital Administation (BMA) from 1992 to 2001 varied from 36.75/100,000 population to 9.41 per 100,000 population, and the highest prevalence was in the 0-4 years age group, 49.37/100,000 population, and 17.67/100,000 population in the 10-14 year age group, with a male to female ratio of 1.33:1. The incidence of complications was 4.08%. The measles cases varied from 65.42/100,000 population in 1994 to 5.38/100,000 population in 1999, and 7.21 in 2000[7].

Complications of measles varied from mild symptoms such as otitis media to bronchitis, pneumonia, encephalitis and diarrhea. Some of the complications may lead to severe respiratory failure and death.

Objectives

To study the clinical presentations of severe cases of measles and its complications in admitted patients and find the correlations of the clinical severity with age, nutritional status and vaccination.

Material and Method

The hospital charts of measles patients admitted to the Queen Sirikit National Institute of Child Health (QSNICH) during 1998-2002 were retrospectively reviewed. Also the Out-Patient Department (OPD) cases of measles during this period were retrieved from the medical record unit of the hospital.

Demographic data, history including history of measles vaccination, physical examinations and laboratory investigations, treatment, hospital course and outcome which were relevant were recorded.

Nutritional status was classified by percent of ideal body weight (IBW), (using weight for age, not weight for height because there were no height records in most of the cases) of the standard growth curve of Thai boys and girls of the Department of Health, Ministry of Public Health. All of the measles cases were diagnosed clinically by their characteristic clinical presentations of fever, cough, coryza, conjunctivitis, Koplik's spots and rash.

Pneumonia was diagnosed based on clinical findings of dyspnea, tachypnea, positive lung signs and the presence of pulmonary infiltration in the chest film. Classification of bacterial or viral pneumonia in the present study was based on the type of pulmonary infiltrations, namely patchy/alveolar and mixed infiltrations were classified as bacterial while interstitial infiltration was classified as viral. The complete blood count (CBC) might add to favor either bacterial or viral pneumonia.

Only moderate and severe pneumonia that needed supportive/symptomatic and specific treatment were admitted to the hospital. Milder cases would not be admitted because of the potential spread in the hospital. Severe pneumonia was classified when the patients were very distressed, usually respiratory rate > 60/minute, hypoxia and needed oxygen therapy.

Paired t-test and Pearson's correlation were used for data analysis in the present study.

Results

During the study period, the total admitted cases of measles were 156 cases while there were1181 cases seen at the OPD .The average ratio of admitted to OPD cases of measles was 1:7.6.

There were 95 boys and 61 girls ($p = 0.68$) and the male to female ratio was 1.56: 1. The age range

was 2 months to 14.8 years and the mean age was 3.1 ± 3.5 years; the mode was 8 months old. Fifty-nine percent of the cases were under 2 years of age; 40% under one year and 23.9% were under 9 months.

Most of the cases were from Bangkok and the surrounding areas (92.8%). Only 7.2% of the cases were from remote provinces. Their parents' occupations were mostly employees (70%) and construction workers (2.5%). Less than 10% worked for the government and 15%worked for private enterprises.

There were 44.4% of cases that had a previous history of measles vaccination (one dose at around 9 months of age). Most infants under 9 months old (91.4%) and 76.2% of 9-12 months old had no history of vaccination. There were more cases with a history of vaccination in older than one year old children; 59.6% vs 40.4% in 1-5 year old; 81.3% vs 18.8% in > 5-10 years old; 77.8% vs 22.2% in > 10 year old children (Table 1).

Most of the cases (66.2%) had normal nutritional status while 12.4% had mild PEM, 4.8% had moderate PEM and 2.1% had severe PEM. Nine percent of the cases had obesity and 5.5% were overweight (Table 2).

Fourteen cases (9%) had underlying diseases: 3 with congenital heart diseases (CHD), 1 with rheumatic heart disease, 2 with thalassemia, 2 with HIV infections and one patient had systemic lupus erythematosus (SLE), acute lymphoblastic leukemia (ALL), nephrotic syndrome, asthma, imperforated anus and Down syndrome and epilepsy with cerebral atrophy. There were 62.2% of patients with pneumonia, 38.1% had diarrhea, 5.2% had bronchitis (x-ray film) and 4.6% had otitis media.

The mean duration of fever at the time of admission was 5.3 ± 2.7 days. Rash (97.4%) and cough (94.2%) were the two most common presentations found in most cases. Coryza was found in 87.1%. Conjunctivitis (42.5%) and Koplik's spots (35.3%) were less common. Hyperpigmentation of the rash was noted in only 6.9%. Liver enlargement was commonly found in 40% of the cases. Dehydration was noted in 10.6% of the cases (Table 3). Fourteen percent of the cases presented with 5 classic signs and symptoms of measles, i.e. cough, coryza, conjunctivitis, Koplik's spots and rash. Most cases (92.4%) presented with at least 3 of those 5 classic signs and symptoms[1].

Among 97 patients who had pneumonia, 29.9% had severe symptoms in whom 65.5% had a chest film which revealed patchy pulmonary infiltration suggestive of bacterial pneumonia, while 70.1% of patients had moderate symptoms and the chest film showed bacterial type of pulmonary infiltration in only 39.7% (p = 0.26). The overall pulmonary infiltration of bacterial pneumonia were 47.4% while 52.6% had interstitial pulmonary infiltration (Table 4).

Blood, stool and urine culture were done in 52.3%, 23.8% and 10.7% of cases, only 2 positive blood

Table 1. Measles vaccination classified by age of patients

Age (months)	Measles vaccination				Total
	Yes		No		
	N	%	N	%	
< 9	3	8.6	32	91.4	35
9-12	5	23.8	16	76.2	21
>12-60	31	59.6	21	40.4	52
> 60-120	13	81.3	3	18.8	16
>120	7	77.8	2	22.2	9
Total	59	44.4	74	55.6	133

Measles vaccination was recalled by history 14.7% or 23 patients are not sure about their childred's vaccination status

Table 2. Nutritional status

Nutritional status	No	%
Normal	96	66.2
Mild PEM	18	12.4
Moderate PEM	7	4.8
Severe PEM	3	2.1
Overweight	8	5.5
Obesity	13	9.0
Total	145	100.0

There are 11 patients or 7.6% of the patients had no record of body weight

Table 3. Symptoms and signs of measles

Symptoms & Signs	No/total	%
Symptoms		
Rash	152/156	97.4
Cough	147/156	94.2
Coryza	135/155	87.1
Signs		
Conjunctivitis	65/153	42.5
Liver enlargement	58/145	40.0
Koplix's spot	53/150	35.3
Dehydration	16/151	10.6
Hyperpigmentation	10/145	6.9

Table 4. Type and severity of pneumonia

Type of pneumonia	Severity				Total (%)
	Moderate		Severe		
	N	%	N	%	
Bacteria (Patchy)	27	39.7	19	65.5	46 (47.4)
Virus (interstitial)	41	60.3	10	34.5	51 (52.6)
Total	68	100.0	29	100.0	97 (100.0)

cultures were obtained, namely Streptococcus viridan isolated from a 22 month-old infant who had mild PEM with severe bacterial pneumonia and Enterobacter spp. isolated from an obese 7-month-old infant with moderate to severe pneumonia who happened to have epilepsy and cerebral atrophy.

There were 6 positive stool cultures, 3 each for salmonella gr B, and gr C.

There were 38 patients (24.4%) who had both pneumonia and diarrhea, and 12.2% of patients had diarrhea only.

The average length of stay in hospital was 5.4 ± 5.1 days while the mean total duration of illness was 8.6 ± 3.8 days. There was one death, a 9-month-old-infant who had normal nutritional status, no underlying diseases, but had severe pneumonia which progressed to ARDS and respiratory failure.

The severity of pneumonia was not correlated with the age (r = 0.087), nutritional status (r = 0.122), or the history of receiving measles vaccine (r = 0.116).

Discussion

The overall incidence of measles cases at the OPD of the QSNICH (previously known as Children's Hospital) were reduced, not so dramatically from about 600 cases in 1980 to 60-470 cases per year (1998-2002) after the introduction of vaccines. Measles is still prevalent in young infants as in the previous QSNICH study in 1980[11] which is the pre-vaccine era, i.e. 60% of cases were < 2 years old. The difference is that there was an increase in cases in < 1 year old; 40% compared to 23.5% and > 5 years old; 13.5% compared to 7.6%. Better vaccine coverage as shown by 44.4% of the cases that had been vaccinated compared to no cases in 1980 had been vaccinated. There was no good herd immunity in Bangkok (92.8% of the cases were from Bangkok and the surrounding areas) because cases in younger infants (< 9 months old) were increased. From the report of The Epidemilogy section of the BMA (Bangkok Metropolitan Administration)[7] the incidence of measles, varied from 36.25 per 100,000 population in 1992 to 9.41 per 100,000 population in 2001. The patients in 0-4 age group had the highest incidence in every year. In the year 2001, the morbidity rate of the 0-4, 5-9, and over 9 years age group was

Table 5. Correlation of severe pneumonia with age, nutritional status and history of measles vaccination

	Severity of pneumonia						
Characteristics	Mild	%	Moderate	%	Severe	%	r
Age (months)							
< 9	17	25.0	7	29.2	0	0	0.087
9-12	17	25.0	2	8.3	1	20.0	
> 12-60	29	42.6	13	54.2	4	80.0	
> 60-120	3	4.4	1	4.2	0	0	
> 120	2	2.9	1	4.2	0	0	
Nutritional status							
Normal	1	1.6	1	4.2	0	0	0.122
Mild PEM	2	3.2	1	4.2	1	20.0	
Moderate PEM	8	12.7	4	16.7	0	0	
Severe PEM	44	69.8	16	66.7	2	60.0	
Overweight	3	4.8	0	0	0	0	
Obesity	5	7.9	2	8.3	1	20.0	
Measles vaccination							
Unknown	34	50.0	12	50.0	2	40.0	0.116
Yes	27	39.7	9	37.5	1	20.0	
No	7	10.3	3	12.5	2	40.0	

49.37/100,000 population, 24.09/100,000 population and 17.67/100,000 population respectively. Access to vaccine services also have to be improved because 26.9% of the cases could have been prevented if they had been vaccinated (excluding cases under 9 months old and expecting 100% efficacy of the vaccine). A mass immunization campaign should be considered to improve herd immunity, at least in Bangkok.

The cases seemed to be less severe because the percentage of admitted cases was lower, only 13.2% compared to 26.1% in 1980[11].

Most Thai infants received measles vaccine at the age of 9 months and in the present study 23% of cases occurred before vaccination, as 91.4% of these infants did not have vaccination. Measles becomes obviously a significant morbidity at 5 months old. These 5-9 months old infants should be vaccinated in order to prevent the illness, but the immune responses among these infants are not as good as older infants with the current available vaccines. The seroconversion was 70% compared with 95% seroconversion when infants were vaccinated at age 9 months[1]. The high titer Edmonston-Zagreb vaccine which is highly immunogenic with a report of having 92% seroconversion in Zairian infants might be useful to these young infants, but unfortunately the field trials in the 3 African countries and Haiti showed a higher mortality in children who received these vaccines than in children who received conventional vaccines so these vaccines were withdrawn in 1992[1]. A new, novel, safe and highly immunogenic measles vaccine is needed for these younger infants.

Two cases of measles aged 2 and 3 months old might be too young to be vaccinated. The mothers of these 2 very young infants must have had no or very low measles antibodies levels so that both infants were not protected against the disease, the mother of the 2 month-old infant had measles herself and transmitted the disease to her infant. Measles immunization should be advised to those expectant mothers who have never had measles or received measles vaccine before they became pregnant in order to protect their young infants against measles, usually from birth to 6-9 months old. Until now there is no measles vaccine that has a good antibody response in infants younger than 4 months old which may be due to the inhibitory effects of maternally derived antibodies or due to the immature immunological systems of these infants[1,7]. Similarly to the younger infants, 76.2% of 9-12 months old infants who had measles did not receive the vaccine so they were susceptible to measles. Twenty-four percent of these infants had been vaccinated and still contracted measles. The reasons why these vaccinated infants still got measles might be due to primary vaccine failure which was reported to be at least 5% in 9-12 months old infants[8]. Others include vaccination after several days of contact[8, 12], breaking of the vaccine cold-chain. Cases over 1 year of age usually had been vaccinated, especially in > 5 years old, i.e. 80% of the cases were vaccinated. Waning of the immunity may be the major explanation in this group of children[13].

The current EPI recommends 2 doses of measles vaccines, the first dose at 9-12 months and a booster dose at primary school entry (Prathom 1) to improve immunity in Thai children. But this schedule may be too late to prevent measles because quite a large number of children in the age group of 1-4 and 5-9 years old got measles.[5,7] In the USA, the current recommendation is that if a child receives a dose of measles vaccine before 12 months of age, 2 additional doses are required beginning at 12-15 months of age and separated by at least 4 weeks. For children, adolescents and adults, 2 doses of measles vaccines are required[8].

Moderate and severe PEM were found only in 6.9% of the cases compared to 17.7% in 1980[13]. Also 14.5% of the cases in this study had a better nutritional status classified as overweight and obese. There is no previous report about measles cases in children who were overweight or obese. Improvement in the nutritional status may explain the nature of the overall less severe cases of measles that require admission but in the present study there was no correlation between severity of the disease and nutritional status.

Most measles cases were diagnosed clinically but only 14% of cases presented typically with all 5 classic signs and symptoms of cough, coryza, conjunctivitis, Koplik spots and rash. Another 80% presented with 3-4 signs and symptoms which were not difficult for measles diagnosis[1]. The less frequent findings were Koplik's spots and conjunctivitis. This is because the mean duration of fever when the patients were seen and admitted was 5.3 ± 2.7 days and Koplik's spots together with conjunctivitis might have disappeared or improved by that time[11,12]. The most constant findings in all cases were rash and probably cough which was the same as in the Dublin outbreak[14]. So every patient in the present

study met the WHO case definition of measles of the integrated guidelines for the primary care management of the sick child (IMCI) in developing countries as follows: a child is classed as having measles if he/she has a generalized rash and one of the following: cough, running nose, or red eyes[1].

The complications of measles found in this study were otitis media, bronchitis, pneumonia, and diarrhea. Bronchitis and otitis were less commonly found because most of the cases were mild and did not need admission. There were no cases with tracheitis, tracheo-bronchitis (croup) which is commonly seen in other areas[11-13]. Also there were no severe cases with meningo-encephalitis.

The most common complications of measles in the present study were pneumonia (62.2%) and diarrhea (38.1%) which is the same for many areas, e.g. Cape Town[15], India[16], Afghanistan[7] and Dublin[14]. In Zimbabwe[17], Bangladesh[18,19] and India[16,18], diarrhea was the major problem and was a significant factor causing mortality. The percentage of patients with pneumonia at the QSNICH was higher than in 1980[13], 62.2% compared to 38.6% but diarrhea was increased a little bit, 38.1% compared to 31.8%. The changing of the virulence or the tissue prevalence of the virus is possible but environmental changes, especially the increase in global air pollution might be one factor contributing to the increasing cases with pneumonia.

Both bacteria and viruses can cause moderate to severe pneumonia[8]. In the present study 47.4% had patchy pulmonary infiltration or lobar pneumonia which suggested bacterial pneumonia and 52.6% had interstitial perihilar infiltration which suggested viral pneumonia, most likely measles viruses. There was no viral study among these cases so in some severe cases, other viral etiologic agents such as Adenovirus or other respiratory viral co-infections with measles as seen in other reports[19] cannot be excluded. Among severe cases of pneumonia, bacteria are more likely the causative agents (65.5%) but it is not statistically significant ($p = 0.26$). While the authors think that bacteria may be the cause of pneumonia more frequently in the group of underweight and overweight/obese patients and that the disease in these groups of patients were more severe than in patients with normal nutritional status but there was no statistical significance ($p = 0.182$). The CFR for children with secondary bacterial pneumonia was double that of children with uncomplicated measles-associated pneumonia: relative risk 2.2 (95% CI 1.2-4.1, $p = 0.02$)[1]. In the present study there was only one death from suspected bacterial pneumonia but a conclusion could not be made.

As in many reports[12], infants seemed to have more severe pneumonia as seen in this study that infants had a longer duration of illness, longer duration of antibiotics and longer length of stay in the hospital but it was not statistically different from older children.

Patients with underlying diseases had no more severe pneumonia than patients without underlying diseases as in another report[20], except for 2 cases of severe pneumonia; one viral pneumonia in an asthmatic child and one bacterial pneumonia in an ALL child. Both HIV infected patients had moderate pneumonia, one related to viral and one related to bacteria.

Diarrhea was more common in under 5 year old children ($p = 0.000$) and only 6 Salmonella group B and C were isolated from these cases. No other organisms such as Shigella, Vibrio cholerae were isolated as in other reports[16, 17].

Empiric antibiotics were given to 59.1% of the patients; 71.2% for all suspected cases of pneumonia. Although viral was more likely to be the cause of pneumonia in measles, most clinicians gave empiric antibiotics in moderate to severe cases of measles with pneumonia.

All cases with both pneumonia and diarrhea were under 5 years old; 47.4% were under 1 year old. Pneumonia in these patients had the same degree of severity compared to patients with only pneumonia. Their nutritional status was not significantly different from those cases with only pneumonia or diarrhea.

WHO, UNICEF[2] and many experts[9, 11, 12] recommend giving vitamin A to measles patients in order to reduce the disease severity but in the present study vitamin A was given to 40% of children (all under 5 years old) and there was no difference in disease severity when compared to those who received and did not receive vitamin A.

One death in the present study was a 9-month-old infant who had no vaccination, no underlying disease and normal nutritional status. He had severe pneumonia which was later complicated by ARDS and respiratory failure. Pneumothorax and subcutaneous emphysema which were common complications in severe cases of measles pneumonia was not observed in this case[21,22].

The CFR at the QSNICH has been reduced from 1.2% in 1980 to 0.6% which is comparable to the national CFR of 0.5%. The current CFR of measles

in other areas of the world is much higher than this[6, 7].

The present study showed no relationship between the severity of measles with age, nutritional status and vaccination. This may be due to better medical care for young infants, fewer cases with moderate to severe PEM and increased vaccine coverage. Improved nutrition, widespread use of vitamin A, increase in vaccine coverage with better vaccine infra-structure and better medical care for infants and children have resulted in a reduction in the measles CFR compared with the pre-vaccine era.

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ความรุนแรงของโรคหัด: การศึกษาในสถาบันสุขภาพเด็กแห่งชาติมหาราชินี

เชิดชู อริยศรีวัฒนา, ศิริเพ็ญ กัลยาณรุจ

บทนำ *: ประเทศไทยยังมีการเกิดโรคหัดปีละหลายพันคน ถึงแม้จะได้มีการกำหนดให้ ฉีดวัคซีนโรคหัดในเด็กอายุ 9 เดือนมาเกือบ 20 ปีแล้ว เด็กที่ป่วยด้วยโรคหัดที่มีอาการรุนแรงซึ่งมักจะมีโรคแทรกซ้อนต้องเข้ารับการรักษาตัวในโรงพยาบาล และมีบางรายเสียชีวิต*

วัตถุประสงค์ *: เพื่อศึกษาอาการทางคลินิกของผู้ป่วยโรคหัดที่มีอาการรุนแรง และโรคแทรกซ้อนของหัดในผู้ป่วยที่เข้ารับการรักษาในโรงพยาบาล รวมทั้งหาความสัมพันธ์ระหว่างอายุ ภาวะโภชนาการ การได้รับวัคซีนป้องกันโรคหัดกับความรุนแรงของโรค*

วัสดุและวิธีการ *: ศึกษาย้อนหลังจากเวชระเบียนของผู้ป่วยที่ได้รับการรักษาแบบผู้ป่วยในของสถาบันสุขภาพเด็กแห่งชาติมหาราชินี (โรงพยาบาลเด็ก) ระหว่างปี พ.ศ.2541-2546 โดยศึกษา ข้อมูลทางประชากร ประวัติการเจ็บป่วย การได้รับวัคซีน การตรวจร่างกาย และการตรวจทางห้องปฏิบัติการ รวมทั้งข้อมูลการรักษาในโรงพยาบาล วิเคราะห์โดยใช้สถิติ paired t-test และ Pearson's correlation*

ผลการศึกษา *: มีผู้ป่วยโรคหัดทั้งหมด 156 คน เป็นเด็กชาย 95 คน เด็กหญิง 61 คน โดยมี อัตราส่วนเด็กชายต่อเด็กหญิง 1.56 : 1 อายุที่น้อยที่สุด 2 เดือน และอายุมากที่สุด 14.8 ปี ค่าเฉลี่ย ของอายุผู้ป่วยคือ 1.5 ปี ผู้ป่วยในกลุ่มอายุ 8 เดือนมีมากที่สุด ผู้ป่วย 59% อยู่ในกลุ่มอายุน้อยกว่า 2 ปี ผู้ป่วย 40% อายุน้อยกว่า 1 ปี และผู้ป่วย 23.9 % อายุน้อยกว่า 9 เดือน ประมาณ 44% ของ ผู้ป่วยมีประวัติฉีดวัคซีน 1 ครั้ง ผู้ป่วยอายุน้อยกว่า 1 ปี ไม่ได้รับวัคซีนหัดถึง 91.4% ตรงกันข้าม กับผู้ป่วยอายุมากกว่า 5 ปี ที่พบว่าได้รับวัคซีนหัด 1 ครั้งถึง 80% ผู้ป่วย 66%มีภาวะโภชนาการผิดปกติ พบว่าผู้ป่วยที่มีภาวะทุโภชนาการระดับ 1,2 และ 3 มีจำนวน 12.4%, 4.8% และ 2.1% ตาม ลำดับ พบว่ามีผู้ป่วย 14 ราย (9%) มีโรคอื่นอยู่ก่อนแล้ว ในการวินิจฉัยโรคพบว่า 92.3% ของผู้ป่วย มีลักษณะอาการและอาการแสดงของโรคหัด 3 อย่างคือ ผื่น ไอ และอาการหวัด จำนวนวันของ อาการไข้ก่อนที่จะได้เข้ารับรักษาตัวในโรงพยาบาลคือ 5.3 วัน โรคแทรกซ้อนของผู้ป่วยที่เข้ารับการรักษาในโรงพยาบาล คือ ปอดบวม (62.2%) อุจจาระร่วง (38.1%) สาเหตุของปอดบวมคือจาก เชื้อไวรัส 52.6% แบคทีเรีย 47.4% มีผู้เสียชีวิต 1ราย มีปอดบวมรุนแรงซึ่งทำให้เกิดอาการ ARDS และระบบหายใจล้มเหลว เด็กทารกมีอุบัติการณ์ของอุจจาระร่วงและภาวะขาดน้ำมากกว่าเด็กโต (p = 0.000) แต่ไม่มีความรุนแรงของปอดบวมมากกว่าเด็กโต (p= 0.512) ความรุนแรงของปอดบวมไม่มีความสัมพันธ์กับอายุ (r = 0.087) ภาวะโภชนาการ (r = 0.122) หรือประวัติของการได้รับวัคซีน (r = 0.116)*

สรุป *: โรคหัดยังเป็นสาเหตุสำคัญอันหนึ่งของการป่วยที่ต้องเข้ารับการรักษาในสถาบัน สุขภาพเด็กแห่งชาติมหาราชินี โดยผู้ป่วยมักมีอาการรุนแรงจากโรคแทรกซ้อน ได้แก่ ปอดบวม และอุจาระร่วง มีผู้ป่วยเสียชีวิต 1 ราย จากปอดบวมรุนแรง ซึ่งทำให้เกิดอาการ ARDS และภาวะการหายใจล้มเหลว เด็กทารกจะมีอุบัติการณ์ของอุจจาระร่วงและภาวการขาดน้ำมากกว่าเด็กโต ความรุนแรงของโรคหัดไม่มีส่วนสัมพันธ์กับอายุ ภาวะโภชนาการและประวัติการได้รับวัคซีน*