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MEASLE'S COMPLICATIONS IN ACUTE PHASE IN PCM CHILDREN, PROSPECTIVE STUDY IN A TERTIARY CARE HOSPITAL

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Abstract:

Objective: *To determine measle's complications in acute phase in PCM children, prospective study in a tertiary care hospital*

Plae and duration of study: *Department of Peadiatrics Medicine Baqai Medical Hospital Karachi, from1st July 2017 to 30th June 2018.*

Study Design; *A cross-sectional study*

Methodology: *In this study, 100 PCM children between 12 and 60 months of age with PCM classification modified GOMEES clssification grade 1, 2 and 3 and diagnosed as measls using WHO criteria were included after ethical approval and informed and written consent. All those had not given informed consent and children with malignancy or metastatic disease were excluded in this study. Brief history was taken, clinical examination was done, and laboratory investigations were done to access the outcome i-e complications of measles in PCM children.*

Result: *Total of 100 children with protein calorie malnutrition were included. 58 children (58%) were males & 42 (42%) were females with the mean age was 29.49±17.597 months. 25 patients (25%) had history of vaccination with measles vaccine and 75 (75%) were not vaccinated with measles vaccine and only one child (1%) had history of vaccination with MMR vaccine. Complications of measles were pneumonia in 80 (80%), acute gastroenteritis in 38(38%), dysentery in 18 (18%), otitis media in 29(29%), vitamin A deficiency in 49(49%), sepsis in 25(25%) and encephalitis in 6(6%).*

Conclusion: *Pneumonia is the major complication in PCM patients with measles followed by diarrhea. Also there is high proportion of PCM children that are not vaccinated and also high proportion of vaccinated PCM children who did not complete the vaccination schedule which is a matter of concern for health planners.*

Key Words: *Measles; Complications; Vaccination, PCM children, Prevention.*

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INTRODUCTION:

Measles is one of the acute viral illnesses among children having the potential for severe and life-threatening complications.[1] Measles virus infected 95 –98% of children by age 18 years and exposure was frequently required in children during early school years.[2] After an incubation period of 8–12 days, symptoms begin with increasing fever (39°C-40.5°C), cough, coryza, and conjunctivitis [3]. Symptoms become strengthen over the 2–4 days before the rashes developed over the body.[4] Measles is highly infectious and transmitted by the respiratory route. Infectivity is maximum in the 3 days before the onset of rash, and 75%–90% of susceptible household contacts develop the disease.[5]. In temperate regions, the incidence is highest in late winter and spring. The prodromal stage occurs 10 to 12 days after exposure and is characterized by two to three days of fever, anorexia, and malaise combined with the triad of cough, conjunctivitis, and coryza[6]The epidemiological association between measles mortality and malnutrition, especially vitamin A deficiency, is well recognized.[7] Measles is capable to cause severe complications among those children who are immune-deficient and malnourished. The most significant complications are blindness, encephalitis, ear infections, severe diarrhea, and pneumonia.[8] In 2008, around 164,000 measles related deaths were reported from the African and South Asian countries because of having poor infrastructure of health. [9] The major complication among patients was pneumonia in 68 (68%) patients. Its frequency was almost equal in vaccinated (52.9%) and non-vaccinated (50%) patients. Among 100 patients, 3 (3%) died during their stay in the hospital while 97 (97%) recovered and were discharged from the hospital. Diarrhea/gastroenteritis was observed in 31% patients as the second most common complication. Other complications remained on the lower side with conjunctivitis being 21%, protein calorie malnutrition 6%, encephalitis 1% and febrile fits 2%.[10]Protein calorie malnutrition (PCM) is associated with increased severity of common infectious diseases, and death amongst children with PCM is almost always as a result of infection. The diagnosis and management of infection are often different in malnourished versus well-nourished children. The purpose of our study is to determine the frequency of measles complications in PCM children. In case of significantly high frequency of complications of measles in PCM children, we can formulate a strategy of starting broad spectrum I/V antibiotic in PCM children at the diagnosis of measles in order to improve the outcome and lessen the morbidity and mortality.

MATERIAL AND METHODS:

This study population was based on a total 100 subjects between 12 and 60 months of age with PCM classifications modified GOMEES classification grade 1,2 and 3 and diagnosed as measles using WHO criteriai.e. fever (38.0 Celsius or more lasting more than 3 days), maculopapular rash (non-vesicular) and cough, coryza or conjunctivitis for $\geq$ 12 hours were included in the study All those had not given informed consent and children with malignancy or metastatic disease were excluded in the study. Vaccination status of the patients against measles were confirmed with the help of patient's vaccination card if available or through the verbal confirmation made by parents of the patients. All the relevant investigations like complete blood count, ESR, CRP, chest x-ray, urea creatinine & serum electrolytes, urine D/R, stool D/R, blood culture & sensitivity (C/S), pus C/S and CSF examination were done where needed. Every patient was observed closely for the development of complications. All demography, clinical history was on a predesigned Performa.

SPSS version 17 was used for data analysis. Frequency and percentage were computed for categorical variables like gender, complications of measles. Values were presented as mean ± standard deviation for continuous variables like age, PCM children with measles, duration of PCM, duration of measles, duration of fever, level of education status of mothers, monthly family income, type of feeding, measles vaccination status, contact history of measles, duration of hospital stay, maximum recorded temperature. Effect modifier like age, duration of PCM, duration of measles, duration of fever, level of education status of mothers, monthly family income, type of feeding, measles vaccination status, contact history of measles, duration of hospital stay, maximum recorded temperature, congenital heart disease, those with unconfirmed measles, malignancy or metastatic disease was controlled through stratification. Chi-square test was used. $P \leq 0.05$ was considered level of significance.

RESULT:

The mean age of patients was 29.49 months with the standard deviation of 17.597 months. The minimum age was 10 months while maximum age was 60 months. As shown in Graph-1.

The descriptive statistics of age is presented in Table-1. The mean length of hospital stay (LOS) was 5.49$\pm$1.709 days. As shown in Graph-2. The descriptive statistics of LOS is presented in Table-1. The mean weight was 9.491$\pm$2.7402 kg. The

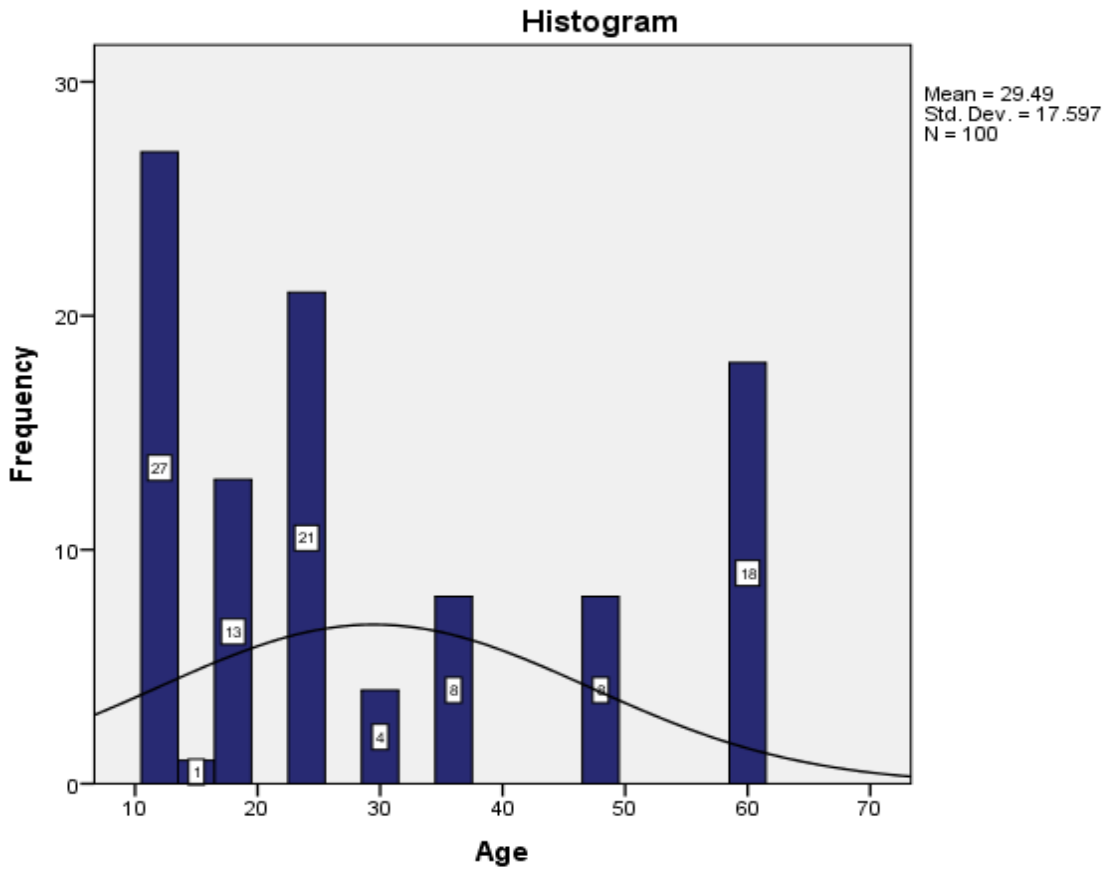
descriptive statistics of weight is presented in Table-1. The mean height was 84.110±12.596 cm. The descriptive statistics of height is presented in Table-1. The mean fronto-occipetal circumference (FOC) was 46.255±2.278cm. The descriptive statistics of FOC is presented in Table-1.The mean mid arm circumference (MAC) was 13.345±1.379 cm. In our study 25 patients (25%) were fully vaccinated, 56 (56%) partially vaccinatedand 19 (19%) were not vaccinated with any vaccine, as shown in Table-2 . Measles antibodies were sent in 38 patients all of which came by Enzyme-linked Immunosorbant Assay (ELISA) kit method, while was not sent in remaining 62 patients who were diagnosed on clinical basis, as shown in Table-2. Marasmus was noted in 18 patients (18%) while Kwashiorkor in 32 patients (32%) & mixed marasmus and kwashiorkorwas noted in 12 patients (12%), and remaining 38 patients (38%) were noted under nutritions shown in Table-3 .Grade I PCM (<80 percentage of weight) was noted in 49 patients (49%), grade II PCM (<70 percentage of weight) in 33 (33%) and grade III PCM (<60 percentage of weight) was noted in 18 (18%), as shown in Table-3

X-ray chest (CXR) findings were right upper lobe consolidation in 5 patients (5%), right lower lobe consolidation in 4(4%), right middle lobe consolidation in 8(8%), left upper lobe consolidation in 8(8%), bilateral lobe consolidation in 10 (10%), infiltrates in 45 (45%) and was clear in 20 (20%), as shown in Table-3.

Complications of measles were pneumonia in patients 80 (80%), acute gastroenteritis in 38(38%), otitis media in 29(29%), vitamin A deficiency (diagnosed clinically on the basis of sign & symptoms like photophobia, bitot spots) in 49(49%), sepsis in 25(25%), encephalitis in 6(6%). As shown in Table-4.

The frequencies of age groups, gender, Malnutrition by Welcome and Modified Gomes were calculated according to complications of measles**.** The results are presented in Table-5, -6 and 7 respectively.

GRAPH-1: Frequency Distribution Of Age (Months)



GRAPH-2: frequency distribution of length of hospital stay (days)

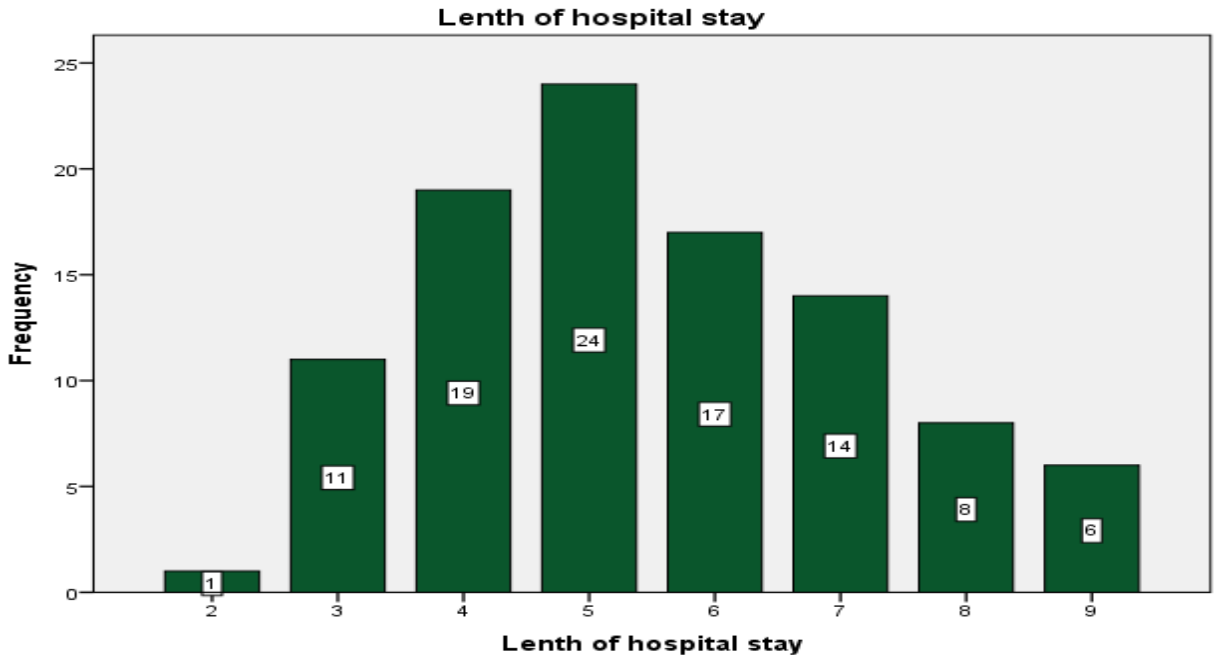


Table-1(Descriptive statistics of age, Mid arm circumference, weight, height & Fronto-occipetal circumference)

Statistics	Age (months)	Mid arm circumference (cm)	Weight (kg)	Height (cm)	Fronto-occipetal circumference (cm)
Minimum	12	7.5	5.5	63	40
Maximum	60	16	20	126	52
Mean&Std. Deviation	29.49±17.597	13.345±1.379	9.491±2.7402	84.110±12.596	46.255±2.278

TABLE – 2: Frequency Distribution Of Vaccination, Measles, Mmr) (N=100).

VACCINATION	FREQUENCY n=(100)	PERCENTAGE (%)
Fully vaccinated	25	25%
Partially vaccinated	56	56%
Not vaccinated	19	19%
Total	**100**	**100%**
Vaccination with MEASLES vaccine		
Yes	25	25%
No	75	75%
Total	**100**	**100%**
Vaccination with MMR vaccine		
Yes	**1**	**1%**
No	99	99%
Total	**100**	**100%**
MEASLES ANTIBODIES		
Positive	**38**	**38%**
Not sent	62	62%
Total	**100**	**100%**

TABLE – 3: Frequency Distribution Of Malnutrition (Welcome &Modified Gomes) & Cxr Findings) (N=100)

MALNUTRITION	FREQUENCY (n=100)	PERCENTAGE (%)
WELCOME		
Marasmus	18	18%
Kwashiorkor	32	32%
Mixed marasmus and Kwashiorkor	12	12%
undernutrition	**38**	**38%**
Modified Gomes		
PCMI (<80 percentage of weight)	**49**	**49%**
PCMII (<70 percentage of weight)	33	33%
PCMIII (<60 percentage of weight)	18	**18%**
CXR FINDINGS		
Right upper lobe consolidation	5	5%
Right lower lobe consolidation	4	4%
Right middle lobe consolidation	8	8%
Left upper lobe consolidation	8	8%
Bilateral lobe consolidation	10	10%
Infiltrates	45	45%
Clear	20	20%

TABLE – 4: Frequency Distribution Of Complications Of Measles (Pneumonia, Acute Gastroenteritis, Otitis Media, Sepsis, Encephalitis & Vitamin A Deficiency) (N=100)

COMPLICATIONS OF MEASLES	FREQUENCY n=(100)	PERCENTAGE (%)
PNEUMONIA		
Yes	80	80%
No	20	20%
Total	**100**	**100%**
ACUTE GASTROENTERITIS		
Yes	38	38%
No	62	62%
Total	**100**	**100%**
DYSENRTY		
Yes	**18**	**18%**
No	**82**	**82%**
Total	**100**	**100%**
OTITIS MEDIA		
Yes	29	29%
No	71	71%
Total	**100**	**100%**
SEPSIS		
Yes	**25**	**25%**
No	**75**	**75%**
ENCEPHALITIS		
Yes	**6**	**6%**
No	**94**	**94%**
VITAMIN A DEFICIENCY		
Yes	49	49%
No	51	51%

TABLE – 5: Complications of Measles (Pneumonia, Acute Gastroenteritis) According to Age, Gender, Malnutrition (Welcome &Modified Gomes) (N=100).

AGE (months)	**COMPLICATIONS OF MEASLES**			
	Pneumonia		**acute gastroenteritis**	
	Yes	No	Yes	No
12-40	57(57%)	17(17%)	27(27%)	47(47%)
41-60	23(23%)	3(3%)	11(11%)	15(15%)
Total	80(80%)	20 (20%)	38(38%)	62(62%)
Total	100(100%)		100(100%)	
P-value	0.153		0.720	
GENDER	**COMPLICATIONS OF MEASLES**			
	Pneumonia		**acute gastroenteritis**	
	Yes	No	Yes	No
Male	44(%)	14(14%)	21(21%)	37(37%)
Female	36(39.2%)	6(6%)	17(17%)	25(25%)
Total	80(80%)	20 (20%)	38(38%)	62(62%)
Total	74(100%)		100(100%)	
P-value	0.224		0.664	
MALNUTRITION (WELCOME)	**COMPLICATIONS OF MEASLES**			
	Pneumonia		**acute gastroenteritis**	
	Yes	No	Yes	No
Marasmus	12(12%)	6(6%)	10(10%)	8(8%)
Kwashiorkor	28(28%)	4(4%)	14(14%)	18(18%)
Mixed marasmus and Kwashiorkor	5(5%)	7(7%)	3(3%)	9(9%)
Undernutrition	35 (35%)	3 (3%)	11 (11%)	17 (17%)
Total	80(80%)	20 (20%)	38(38%)	62(62%)
Total	100(100%)		100(100%)	
P-value	0.002		0.518	
MALNUTRITION (Modified Gomes)	**COMPLICATIONS OF MEASLES**			
	Pneumonia		**acute gastroenteritis**	
	Yes	No	Yes	No
PCMI (<80 % of weight)	39(33%)	10(10%)	19(19%)	30(30%)
PCMII (<70 % of weight)	26(20%)	7(7%)	15(15%)	18(18%)
PCMIII (<60 % of weight)	15(11%)	3(3%)	4(4%)	14(14%)
Total	80(80%)	20 (20%)	38(38%)	62(62%)
Total	100(100%)		100(100%)	
P-value	0.923		0.260	

TABLE –6: Complications of Measles (Otitis Media, Vitamin A Deficiency) According to Age, Gender, Malnutrition (Welcome &Modified Gomes) (N=100)

AGE (months)	**COMPLICATIONS OF MEASLES**			
	Otitis media		**vitamin A deficiency**	
	Yes	No	Yes	No
12-40	20(20%)	54(54%)	37(37%)	37(37%)
41-60	9(9%)	17(17%)	12(12%)	14(14%)
Total	29(29%)	71(71%)	49(49%)	51(51%)
Total	100(100%)		100(100%)	
P-vlaue	0.459		0.252	
GENDER	**COMPLICATIONS OF MEASLES**			
	Otitis media		**vitamin A deficiency**	
	Yes	No	Yes	No
Male	20(20%)	38(38%)	30(30%)	28(28%)
Female	9(9%)	33(33%)	19(19%)	23(23%)
Total	29(29%)	71(71%)	49(49%)	51(51%)
Total	100(100%)		100(100%)	
P-value	0.156		0.522	
MALNUTRITION (WELCOME)	**COMPLICATIONS OF MEASLES**			
	Otitis media		**vitamin A deficiency**	
	Yes	No	Yes	No
Marasmus	10(10%)	8(8%)	13(13%)	5(5%)
Kwashiorkor	8(8%)	24(24%)	12(12%)	20(20%)
Mixed marasmus and Kwashiorkor	2(2%)	10(10%)	5(5%)	7(7%)
Under nutrition	9 (9%)	29 (29%)	19 (19%)	19 (19%)
Total	29(29%)	71(71%)	49(49%)	51(51%)
Total	100(100%)		100(100%)	
P-value	0.407		0.179	
MALNUTRITION (Modified Gomes)	**COMPLICATIONS OF MEASLES**			
	Otitis media		**vitamin A deficiency**	
	Yes	No	Yes	No
PCMI (<80 % of weight)	15(15%)	34(34%)	22(22%)	27(25%)
PCMII (<70 % of weight)	8(8%)	25(25%)	14(14%)	19(19%)
PCMIII (<60 % of weight)	6(6%)	12(12%)	13(13%)	5(5%)
Total	29(29%)	71(71%)	49(49%)	51(51%)
Total	100(100%)		100(100%)	
P-value	0.745		0.091	

TABLE –7: Complications of Measles (Sepsis, Encephalitis) According to Age, Gender, Malnutrition (Welcome &Modified Gomes) (N=100)

AGE (months)	COMPLICATIONS OF MEASLES			
	Sepsis		Encephalitis	
	Yes	No	Yes	No
12-40	17(17%)	57(57%)	4(4%)	70(68%)
41-60	8(8%)	18(18%)	2(2%)	24(26%)
Total	25(25%)	75(75%)	6(6%)	94(94%)
Total	100(100%)		100(100%)	
P-value	0.490		0.872	
GENDER	COMPLICATIONS OF MEASLES			
	Sepsis		Encephalitis	
	Yes	No	Yes	No
Male	18(18%)	40(40%)	6(5%)	52(52%)
Female	7(7%)	35(35%)	0(0%)	42(42%)
Total	25(25%)	75(75%)	6(6%)	94(94%)
Total	100(100%)		100(100%)	
P-value	0.101		0.058	
MALNUTRITION (WELCOME)	COMPLICATIONS OF MEASLES			
	Sepsis		Encephalitis	
	Yes	No	Yes	No
Marasmus	4(4%)	14(14%)	1(1%)	17(17%)
Kwashiorkor	8(8%)	24(24%)	3(3%)	29(29%)
Mixed marasmus and Kwashiorkor	3(3%)	9(9%)	1(1%)	11(11%)
Undernutrition	10 (10%)	28(28%)	1(1%)	37(37%)
Total	25(25%)	75(75%)	6(6%)	94(94%)
Total	100(100%)		100(100%)	
P-value	0.100		0.727	
MALNUTRITION (Modified Gomes)	COMPLICATIONS OF MEASLES			
	Sepsis		Encephalitis	
	Yes	No	Yes	No
PCMI (<80% of weight)	9(9%)	40(40%)	3(5%)	46(46%)
PCMII (<70 % of weight)	11(11%)	22(22%)	1(2%)	32(32%)
PCMIII (<60 % of weight)	5(5%)	13(13%)	2(5%)	16(16%)
Total	25(25%)	75(75%)	6(12%)	94(94%)
Total	100(100%)		100(100%)	
P-value	0.294		0.064	

DISCUSSION:

The epidemics of measles still common many parts of the world including Pakistan resulting in high morbidity and mortality. Epidemics of measles can arise in communities with low immunization coverage and can be a major source of measles out breaks.[11] The results of this study showed that 19% of the children are completely unimmunized, and 75% children are without measles vaccination. Such vaccination status could be the cause of the said outbreak. The Rate of immunization status of entire country is very low according to Pakistan Health & DemographicSurvey (PDHS) 2012-13 report; it is 47.45% for the country and is just 16.4% in Balochistan.[12] However other causative factors such as malnutrition, vitamin A deficiency and immune suppression may also have a role to play in low socioeconomic conditions as were evident in the communities in UC Manzari.

The major factors responsible for reappearance of measles include low vaccination coverage, failure of getting the second/booster dose of measles vaccine at 15 months age, vaccine failure, poor health infrastructure and under-nutrition among children in

the developing countries.[13] Similar results were shown by Rabia et al in their study.[14] In this study 25 patients (25%) were fully vaccinated, 56 (56%) partially vaccinated. The reasons behind the development of measles in vaccinated children may be low efficacy of vaccine, declining immunity against measles with growing age, inadequate maintenance of cold chain resulting in loss of vaccine potency, faulty techniques of administering the vaccine and low vaccination coverage among the susceptible children. Similar results were reported by many other researchers.[11,15,16] In this study the most common complication of measles was pneumonia which was seen in patients 80(80%), as compare to to Rasid et al[13] study the most common complication among the patients admitted with measles was pneumonia that was present in 68% of cases. These results are in accordance with those of studies conducted by Sultana et al and Joyce et al. where pneumonia was observed in 63.6% and 75% cases respectively.[17]

In our study vitamin A deficiency was noted in 49% children the second most common complication while dysentery was seen in 18 patients (18%) and acute gastroenteritis was noted in 38% children the third most common complication as compare to Rashid et al[13] study in which Diarrhea/gastroenteritis was observed in 31% patients as the second most common complication. Similar results were observed by Sultana et al. and Mohammad et al. in their studies where diarrhea was the second most common complication of measles, 27.3% and 32% respectively.[20,21]

In our study the other complications of measles were otitis media in 29(29%) children, sepsis in 25(25%), encephalitis in 6(6%), while in Rasid et al[13] study the other complications remained on the lower side with conjunctivitis being 21%, protein caloriemalnutrition 6%, encephalitis 1% and febrile fits 2%.

Hence, majority of measles patients develop pneumonia as the major complication followed by diarrhea and dehydration and these two complications are responsible for the majority of deaths. Diarrhea also results in malnourishment complicating the already weakened immune status of measles patients and potentiating the effects of measles among these children.[14] Rashid et al[13] study found that there is high association of contact with measles patients and subsequent development of disease. History of contact with a case of measles was present in 70% of patients that is very close to the documented secondary attack rate of measles in the literature (around 80%).[20]

CONCLUSION:

Pneumonia is the major complication in patients with measles followed by diarrhea. There are high proportion of children who are not vaccinated and most vaccinated children who did not complete the vaccination schedule which is a matter of concern for health planners.

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