The Professional Medical Journal
www.theprofesional.com

DOI: 10.29309/TPMJ/2019.26.07.3780

ORIGINAL PROF-0-3780

RELATIONSHIP OF MEASLES CASES IN MEASLES VACCINATED CHILDREN DURING OUTBREAK OF MEASLES IN BAHAWALPUR.

Shahzadi Asma Tahseen[1]

1. MBBS, FCPS (Pediatric Medicine)
Senior Registrar
Department of Pediatrics
The Civil Hospital, Bahawalpur.

Correspondence Address:
Dr. Shahzadi Asma Tahseen
Department of Pediatrics
The Civil Hospital, Bahawalpur.
asmatahseen013@gmail.com

Article received on:
07/06/2018
Accepted for publication:
08/11/2018
Received after proof reading:
25/06/2019

ABSTRACT… To evaluate the clinical profile and case fatality rate and their comparison in relation with vaccination status in admitted children. **Study Design:** Case series retrospective study. **Setting:** Pediatric units of the tertiary care Hospitals (Bahawal Victoria Hospital and the Civil Hospital) affiliated with Quaid-e-Azam medical College Bahawalpur situated in Southern Punjab, Pakistan). **Period:** 01/01/2016 to 06/07/2016. **Methods and Material:** A clinical diagnosis of measles (as made by consultants of said Pediatric units) and residing in Bahawalpur district for more than one month of period before admitting in the hospital was included and reviewed. The help of Statistical department of Executive District Officer Health Bahawalpur was taken for missing information as the measles is notifiable disease and all cases were notified to Executive District Officer Health. The children who were nonresident of Bahawalpur District or with incomplete data were excluded. The children were divided into three groups depending on number of measles vaccine doses given. **Results:** The data of 557 children admitting during the period 01/01/2016 to 06/07/2016 with a clinical diagnosis of measles and resident of Bahawalpur district was included. 52.97% were males. 26.57% were unvaccinated and 73.43% vaccinated (39.14% with one dose and 34.29% with two doses). The mean age ± SD in unvaccinated children was 24.68±27.04, with one dose vaccination 50.94 ±35.58 and with two doses vaccination was 45.05 ±23.67 months. The case fatality rate was 2.87%. The case fatality was significantly higher in males vaccinated with two doses of vaccine as compared to either ones vaccinated with one dose or unvaccinated ones but this difference was not found in females. **Conclusion:** This study shows that there is urgent need of proper surveillance of measles cases.

Key words: Case Fatality, Measles, One Dose, Outbreak, Two Doses, Vaccination, Zero Dose.

Article Citation: Tahseen SA. Relationship of measles cases in measles vaccinated children during outbreak of measles in bahawalpur. Professional Med J 2019; 26(7):1125-1130. **DOI:** 10.29309/TPMJ/2019.26.07.3780

INTRODUCTION

Measles is a vaccine preventable highly contagious disease with high morbidity and mortality. The case fatality rate varies from less than 0.01% in developed countries to more than 5% in developing countries.[1,2] Globally the measles incidence decreased 75% and, mortality decreased 79% while measles first dose coverage increased from 72 to 85% during 2000-2015.[3] The measles vaccine is safe, effective and inexpensive. The measles vaccination is given at 9 months and at 15 months of age in the Expanded Program for Immunization (EPI) in Pakistan. The second dose was introduced in EPI in Pakistan in April 2009. The vaccination coverage in Pakistan against measles first dose, with fluctuations, increased from 77% in 1991 to 88% in 2012 and then fell to 66% in 2013.

Measles epidemics are still going on in various countries with some of the best, and, some of the worst health systems in the world and even those areas where it had been eradicated.[4] Measles is endemic in Pakistan with periodic epidemics. There were more than 8700 cases of measles reported by Pakistan to WHO in 2013 which were maximum cases in a year since 1991.[5] This epidemic, claimed the maximum casualties when compared with recent outbreaks occurring in other parts of world.[4] This epidemic started in late November 2012 in Sindh and continued into 2014 in other parts of the country involving all of Pakistan's provinces including the Punjab. This part of Punjab province (Bahawalpur district)

was mainly affected during the first nine months of 2013.

The measles vaccine effectiveness is 96.7% with one and 99.7% with two doses[6] while its effectiveness with single dose was found to be 87.4 and 93% in Pakistan.[7] The vaccine failure rate had been reported as high as 50% in developing countries.[8] There is general consensus that measles in vaccinated children is not as severe as in unvaccinated children.[9,10,11,12,13]

The purpose of this study is to evaluate the clinical profile and case fatality rate and their comparison in relation with vaccination status in admitted children.

METHODS AND MATERIAL

This study was conducted in the Pediatric units of the tertiary care Hospitals (Bahawal Victoria Hospital and the Civil Hospital) affiliated with Quaid-e-Azam medical College Bahawalpur situated in Southern Punjab, Pakistan).

The data of children admitting during the period 01/01/2016 to 06/07/2016 with a clinical diagnosis of measles (as made by consultants of said Pediatric units) and residing in Bahawalpur district for more than one month of period before admitting in the hospital was included and reviewed. The help of Statistical department of Executive District Officer Health Bahawalpur was taken for missing information as the measles is notifiable disease and all cases were notified to Executive District Officer Health. The children who were nonresident of Bahawalpur District or with incomplete data were excluded. The children were divided into three groups depending on number of measles vaccine doses given.

The qualitative data was compared by Chi square test while One-Way ANOVA was used to compare the quantitative data. P value <0.05 was taken as significant. Tukey HSD Test was used to compare more than two groups if p value was <0.05 in One-Way ANOVA test. The VassarStats program available at: http://vassarstats.net/index.html was used for analysis of data.

RESULTS

There were 557 children with clinical measles who were included in the study. The comparison of mean age $\pm$ SD, the mean duration from onset of fever to onset of rash $\pm$ SD and mean duration from onset of fever to admission $\pm$ SD in various groups (male versus female, unvaccinated versus vaccinated with one dose versus vaccinated with two doses children, unvaccinated versus vaccinated with one dose versus vaccinated with two doses male children, unvaccinated versus vaccinated with one dose versus vaccinated with two doses female children, unvaccinated children with age $\leq$ 9 months versus unvaccinated children with age $>$ 9months and the cases survived versus cases died) are shown in Table-I. There were 79 (14.18%) children who were unvaccinated and had measles before $\leq$ 9 months of age (Table-I).

There were 16 deaths giving case fatality rate as 2.87%. The comparison of case fatality in various groups are shown in Table-II. The case fatality rate was significantly higher in children vaccinated with two dose (5.24%) as compared with children vaccinated with one dose (2.29%) and unvaccinated children (0.68%).

DISCUSSION

There were 52.97% males in this study. Other national[11-21] and international[10,22,23] studies except two national studies[24,25] and one international study[9] showed male dominance.

Both national[11-14,16-20,24,25] and international[9,22,23,26,27] studies, unlike this study, showed high rate of unvaccinated children. Rabia et al 2014[15] showed that 62% were vaccinated (only 8.6% with two doses).

The higher age for measles, unlike this study, was seen in two national[17,19] and two international[10,26] studies while other national[11,12,13,20,25] and international[9,23,27] studies showed occurrence of the disease at lower age group.

Group	Total Cases	Age in Months		Duration from onset of fever to onset of rash (days)		Duration from onset of fever to admission (days)	
		Mean±SD	P-Value	Mean±SD	P-Value	Mean±SD	P-Value
Sex Male Female	295(52.97) 262(47.03)	40.27±32.87 43.82±29.87	0.185	2.76±1.39 2.85±1.45	0.428	5.41±2.08 5.66±1.97	0.153
Vaccination Status Children with zero dose(M0) Children with one dose(M1) Children with two dose (M2)	148(26.57) 218(39.14) 191(34.29)	24.68±27.04 50.94±35.58 45.05±23.67	<.0001 M1 vs M2 NS* M1 vs M0 P<.01 M2 vs M0 P<.01	2.94±1.50 2.87±1.36 2.61±1.4	0.067	5.49±2.07 5.69±1.85 5.37±2.19	0.273
Vaccination Status of Males Males with zero dose(MM0) Males with one dose(MM1) Males with two dose(MM2)	91 (30.85) 105(35.59) 99 (33.56)	22.75±28.21 51.48±36.91 44.50± 25.02	<.0001 MM1 vs MM2 NS* MM1 vs MM0 P<.01 MM2 vs MM0 P<.01	2.83±1.51 2.71±1.42 2.73±1.26	0.803	5.36±2.26 5.41±1.68 5.46±2.30	0.942
Vaccination Status of Females Females with zero dose(FM0) Females with one dose (FM1) Females with two dose(FM2)	57 (21.76) 113(43.13) 92 (35.11)	27.75±25 50.44±34.44 45.64±22.24	p<.0001 FM1 vs FM2 NS* FM1 vsFM0 P<.01 FM2 vs FM0 P<.01	3.12±1.49 2.99±1.45 2.51±1.38	0.0167 FM1 vs FM2 NS* FM1 vs FM0 NS FM2 vs FM0 P<.05	5.7±1.74 5.96±1.96 5.27±2.06	0.045 M1 vs M2 NS* M1 vs M0 NS* M2 vs M0 NS*
Zero Dose Vaccine Group Children with age ≤ 9 months Children with age > 9months	79(53.38) 69 (46.62)	6.46±1.91 45.56±27.38	<.0001	2.75±1.47 3.16±1.51	0.095	4.91±2.14 6.16±1.8	0.0002
Outcome Cases survived Cases died	541(97.13) 16 (2.87)	42.51±31.73 22.69±12.36	0.013	2.79±1.41 3.06±1.61	0.455	5.51±2.03 6.06±2.05	0.289

Table-I. Clinical profile of measles cases
***NS not significant**

he case fatality rate was 2.87% in this study. The national studies[20,25] showed lower case fatality rate while other ones[14,15,16,17,19,24] gave higher values (3.41% - 16%). The international studies[22,23,26-29] also gave variable results from 0- 8.5%. The case fatality rate was higher in males (4.07%) as compared to females (1.53%) but the difference was insignificant. Aurangzeb B et al 2005[17], other Pakistani study, showed 3.41 % case fatality rate in males but zero in females. Hussain S et al 2016[20] showed mortality was 1.47 % and the patient who died was a male and unvaccinated. The study conducted in Cameroon[23] also showed that the survival was better in females as compared to males. Grais RF et al 2007[30] found excess measles mortality in females.

This study showed that case fatality was significantly higher in children vaccinated with two doses of vaccine (5.24%) as compared to either ones vaccinated with one dose (2.29%) or unvaccinated ones (0.68%) but other studies showed that mortality was significantly associated with unvaccinated status.[14,17,19,24]

The case fatality was significantly higher in males vaccinated with two doses of vaccine as compared to either ones vaccinated with one

Group	Total Cases (%)	Deaths	Case Fatality Rate (%)	P-Value
Sex				
Male	295 (52.97)	12	4.07	0.124
Female	262 (47.03)	4	1.53	
Vaccination Status				
Children with zero dose	148 (26.57)	1	0.68	0.036
Children with one dose	218 (39.14)	5	2.29	
Children with two dose	191 (34.29)	10	5.24	
Vaccination Status of Males				
Males with zero dose	91 (30.85)	0	0	0.019
Males with one dose	105 (35.59)	4	3.81	
Males with two dose	99 (33.56)	8	8.01	
Vaccination Status of Females				
Females with zero dose	57 (21.76)	1	1.75	0.744
Females with one dose	113 (43.13)	1	0.88	
Females with two dose	92 (35.11)	2	2.17	
Zero Dose Vaccine Group				
Children with age ≤ 9 months	79 (53.38)	1	1.27	00
Children with age > 9months	69 (46.62)	0	00	

Table-II. Case mortality of measles cases

dose or unvaccinated ones but this difference was not found in females.

There were 14.18% children in this study who had measles before ≤ 9 months of age while other national studies[11,20,25,31,32] showed 13.5% - 54.4% had measles before ≤ 9 months of age.

The case fatality rate in unvaccinated children who had measles before ≤ 9 months of age was 1.27% as compared to unvaccinated children above 9 months of age. Other studies[31,32] gave variable results.

The differences (especially significantly high mortality rate in children vaccinated with two doses) in this study from others may be due to that it is hospital based study and there is analysis of only available data and may not true reflect the picture. The record was missing about the nutrition status, exposure to other infectious diseases, presence of vitamin A deficiency, living conditions and whether the case was index or secondary one, type of complications present in the case. These factors may also affect the severity and case mortality of the disease.[1,2] Moreover the diagnosis of measles was clinical and was not confirmed by laboratory. The death due to measles was labeled by the duty pediatrician. So it is very difficult to interpret the high mortality among vaccinated group. In conclusion, there is urgent need of improvement in measles case surveillance.

REFERENCES

1. No authors listed. **Measles vaccines: WHO position paper – April 2017.** Wkly Epidemiol Rec 2017; 92(17):205-27.

2. Wolfson LJ, Grais RF, Luquero FJ, Birmingham ME, Strebel PM. **Estimates of measles case fatality ratios: A comprehensive review of community-based studies.** Int J Epidemiol 2009; 38(1):192-205.

3. Patel MK, Gacic-Dobo M, Strebel PM, Dabbagh A, Mulders MN, Okwo-Bele JM, et al. **Progress toward regional measles elimination - worldwide, 2000-2015.** MMWR Morb Mortal Wkly Rep 2016; 65(44): 1228-33.

4. Furuse Y, Oshitani H. **Global transmission dynamics of measles in the measles elimination Era.** Viruses 2017; 9(4):1-10.

5. WHO Organization. **WHO vaccine-preventable diseases: monitoring system.** 2016 global summary. http://apps.who.int/immunization_monitoring/globalsummary/countries?countrycriteria%5Bcountry%5D%5B%5D=PAK&commit=OK . [accessed 25 May 2017].

6. Pillsbury A, Quinn H. **An assessment of measles vaccine effectiveness, Australia, 2006-2012.** Western Pac Surveill Response J 2015; 6(3):43-50.

7. Zahidie A, Wasim S, Fatmi Z. **Vaccine effectiveness and risk factors associated with measles among children presenting to the hospitals of Karachi, Pakistan.** J Coll Physicians Surg Pak 2014; 24(12):882-8.

8. Khan T and Qazi J. **Measles outbreaks in Pakistan: Causes of the tragedy and future implications.** Epidemiol Rep 2014; 2:1.

9. Faneye AO, Adeniji JA, Olusola BA, Motayo BO, Akintunde GB. **Measles virus infection among vaccinated and unvaccinated children in Nigeria.** Viral Immunol 2015; 28(6):304-8.

10. Mitchell P, Turner N, Jennings L, Dong H. **Previous vaccination modifies both the clinical disease and immunological features in children with measles.** J Prim Health Care 2013;5(2):93-8.

11. Furrukh M, Jalil A, Anwar S, Aslam Z, Javed T. **Measles-demographics and vaccination status.** JRMC (Students Supple) 2015:19(S-1):21-23.

12. Sultana A, Sabir SA, Awan A. **Characteristics of patients with measles admitted to Allied Hospitals Rawalpindi Medical College.** J Ayub Med Coll Abbottabad 2015; 27(2):318-22.

13. Khan I, Khan A, Khan H, Khan A. **Study of vaccinated and unvaccinated measles patients.** Gomal J Med Sci 2014; 12:138-41.

14. Hussain M, Ali L, Khan J. **Clinical outcome of Measles in hospitalized children and associated risk factors for developing complications.** Pak Pediatr J 2008; 32(1):3-10.

15. Rabia M, Naeemullah S, Shabbir A, Kamran S. **Measles – Immunization Status and Outcome.** JRMC 2014; 18(2):205-8.

16. Anis-ur-Rehman, Siddiqui TS, Idris M. **Clinical outcome in measles patients hospitalized with complications.** J Ayub Med Coll Abbottabad 2008; 20(2):14-6.

17. Aurangzeb B, Nisar YB, Hazir T, Burki F, Hassan M. **Clinical outcome in children hospitalized with complicated measles.** J Coll Physicians Surg Pak 2005; 15(9):547-51.

18. Rahim F, Habib-ur-Rehman, Afridi -Rehman JM, Afridi JM. **Measles- demographic profile and complications in children.** J Med Sci 2011; 19(4): 174-6.

20. Khan M, Khan KMA, Ahmed A. **Audit of measles cases in a tertiary care hospital.** Pak Pediatr J 2013; 37(3):143-8.

21. Hussain S, Yasir M, Tarar SH, Sabir MUD. **Measles: Demographic profile and associated morbidities of measles cases admitted in a teaching hospital.** Pak Armed Forces Med J 2016; 66(1):92-7.

22. Mohammad A, Irshad M, Khan B. **A comparative study of measles complications in vaccinated versus unvaccinated children.** JPMI 2011; 25(1):4-8.

23. Ganesh R, Vasanthi T. **Audit of measles infection in children from A Tertiary Hospital.** Indian Pediatr 2009; 46(1): 81-2.

24. Njim T, Agyingi K, Aminde LN, Atunji EF. **Trend in mortality from a recent measles outbreak in Cameroon: A retrospective analysis of 223 measles cases in the Benakuma Health District.** Pan Afr Med J 2016; 23:135.

25. Mushtaq A, Naz S, Bari A, Masood T. **Measles in children: Still a problem today.** Pak J Med Health Sci; 6(3):755-8.

26. Zahoorul-Haq M, Masood N, Sharif M, Asghar RM. **Measles; review of cases admitted in Paediatric Department Benazirbhutto Hospital Rawalpindi during measles epidemic 2013.** Professional Med J 2015;22(9):1116-1121.

27. Deepa KS. **"Clinical profile of measles in children admitted to A Rural Tertiary Care Hospital".** JEMDS 2015; 4(460:7995-9.

28. Fetuga MB, Jokanma OF, Ogunfowora OB, Abiodun R. **A ten-year study of measles admissions in a Nigerian Teaching Hospital.** Niger J Clin Pract 2007; 10(1):41-6.

29. Sitaula S, Awasthi GR, Thapa JB, Joshi KP, Ramaiya A. **Measles outbreak among unvaccinated children in Bajura.** JNMA J Nepal Med Assoc 2010; 50(180):273-6.

30. Najjar Z, Hope K, Clark P, Nguyen O, Rosewell A, Conaty S. **Sustained outbreak of measles in New South Wales, 2012: Risks for measles elimination in Australia.** Western Pac Surveill Response J 2015; 5(1): 14-20.

31. Grais RF, Dubray C, Gerstl S, Guthmann JP, Djibo A, Nargaye KD, et al. **Unacceptably high mortality related to measles epidemics in Niger, Nigeria, and Chad.** PLoS Med 2007; 4:e16.

32. Saleem AF, Zaidi A, Ahmed A, Warraich H, Mir F. **Measles in children younger than 9 months in Pakistan.** Indian Pediatr 2009 Nov; 46(11):1009-12.

33. Martins CL, Garly ML, Balé C, Rodrigues A, Ravn H, Whittle HC, et al. **Protective efficacy of standard Edmonston-Zagreb measles vaccination in infants aged 4.5 months: interim analysis of a randomized clinical trial.** BMJ 2008; 337:a661.

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Shahzadi Asma Tahseen	Paper writing, research, data collection and analysis