

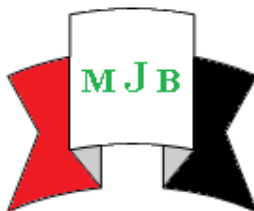
Study of Pertussis Disease in Al-Hashimiya District / Babylon Governorate or The Years 2009 – 2013

Makki Hassan Kadhum* Nahida Mohammed Al-Janabi**

*Babylon Health Directorate, Al-Hashimiya Sector.

E-mail : makkialshuraifee@yahoo.com

** College of Health and Medical Technology, Baghdad



Received 18 May 2014

Accepted 4 June 2014

Abstract

Objectives of this study to identify occurrence of pertussis disease and vaccination status of affected children through the period from 2009-2013 in Al-Hashimiya district and to study the association between the disease and vaccination status with some related variable. This study was a descriptive, retrospective study, carried out during the period from 9th January 2014 till 10th of March 2014. The study sample was (755) cases of affected children with pertussis disease.

The results indicated that the majority of registered cases was reported at the first year (2009) and they are accounted 257(34%), the majority of registered cases was reported at AL- Midhatyia 319(42.3%). Age groups and Gender, they are accounted non significant differences, the higher percentage of registration cases were reported at rural areas 415(55%), the majority of registration cases were reported as illiterate 452(59.9%). The present study showed that 458(60.7%) of patients were vaccinated with DPT vaccine. This study revealed that highly significant differences are registered at $P<0.01$ concerning the relationships of vaccinated children with DPT vaccine according to some related variables (years, and Al-Hashimiya district areas).

Keywords: Pertussis disease, DPT vaccine, Vaccination.

دراسة عن مرض السعال الديكي في قضاء الهاشمية / محافظة بابل
للسنوات من ٢٠٠٩ - ٢٠١٣

الخلاصة

تهدف هذه الدراسة لمعرفة حدوث مرض السعال الديكي والحالة المناعية للأطفال المصابين بالمرض للسنوات من ٢٠٠٩-٢٠١٣ في قضاء الهاشمية وكذلك دراسة العلاقة بين المرض والحالة اللقاحية مع بعض المتغيرات ذات الصلة. هذه الدراسة كانت دراسة وصفية، استرجاعية نفذت خلال الفترة من ٩ كانون الثاني ٢٠١٤ ولغاية ١٠ مارس ٢٠١٤. عينة الدراسة بلغت (٧٥٥) حالة من الأطفال المصابين بمرض السعال الديكي. أشارت النتائج في هذه الدراسة بأن أغلبية الحالات المرضية سجلت خلال العام ٢٠٠٩ وكانت (٢٥٧) (٣٤%)، وأكثرها سجلت في منطقة المدحتية حيث كانت (٣١٩) (٤٢.٣%). بخصوص الفئات العمرية والجنس لم يظهر وجود اختلاف معنوي بينهما في حين أعلى نسبة من الحالات سجلت في مناطق الارياف وكانت (٤١٥) (٥٥%). وكانت أغلبية الحالات المسجلة ضمن المستوى التعليمي (الاميين) حيث كانت (٤٥٢) (٥٩.٩%). الدراسة الحالية أظهرت بأن (٤٥٨) (٦٠.٧%) من المرضى كانوا ملقحين باللقاح الثلاثي (DPT). وكشفت هذه الدراسة وجود اختلافات معنوية كبيرة تم تسجيلها ($P<0.01$) بشأن العلاقات بين الأطفال الملحقين باللقاح الثلاثي وفقا لبعض المتغيرات ذات الصلة المتمثلة (بالسنوات ومناطق قضاء الهاشمية).

Introduction

Pertussis or (whooping cough) is an acute contagious disease and bacterial infection involving the respiratory tract. It is a highly communicable endemic disease with worldwide occurrence, Pertussis characterized by three stages: catarrhal stage, paroxysmal stage and the third is a convalescent stage.[1,2].

The infectious agent of this disease is one of the Bordetella species, a small aerobic gram-negative coccobacillus called Bordetella pertussis (B. p), for which the human being is the only known reservoir [3].

The disease spread by air-borne respiratory droplets when an infected person coughs or sneezes, or via direct contact with secretions from the nose or throat. [4].

Pertussis complications include: apnea, cyanosis, otitis media, pneumonia, hemorrhages, seizures, encephalopathy and death [5].

Polymerase chain reaction (PCR), culture, and serology are the mainstay of the laboratory diagnosis of pertussis[6].

The World Health Organization(WHO) estimates a global total of 48.5 million cases of pertussis per year, with 295,000–390,000 deaths[7].

The WHO recommends a multi-dose immunization regimen to prevent illness and disease transmission: diphtheria, tetanus, and pertussis (DTP) vaccine at 2,4,6 months of life, with a booster dose at 18 months and 1- 6 years [8].

Methodology

This study was a descriptive, retrospective study was conducted at Al-Hashimiya district in Babylon Governorate. Al-Hashimiya district consisted of 5 areas (Al-Hashimiya center, AL- midhatyia, Al-Shomaly, Al-Qasim and Al-Taleaa).

This study consisted of (755) cases of affected children with pertussis disease (male and female),which diagnosed clinically by the physicians, this cases

collected from records of Al-Hashimiya sector / communicable diseases unit through the period from January 2009 to December 2013.

Data collection lasted from 9th of January 2014 till 10th of March 2014. The time sequence of data collection was continued for a period of two months, Sample of the study collected from records of communicable diseases unit in Al – Hashimiya sector, in addition to that, the researcher recorded vaccination status of patients from immediately notification form because this information not present in the records. Statistical analysis of this study by (SPSS) version (10), which include : Chi-square, Binomial test, Contingency coefficient.

Results

The results in this study showed that the majority of the studied period of registered cases was reported at the first year (2009), and they are accounted 257(34%), while the low registered cases was reported at the period (2011), and they are accounted 54(7.2%), table (1) and figure (1).

With respect to item of (Al-Hashimiya District's Sectors), the majority of registered cases was reported at AL-Midhatyia, and they are accounted 319(42.3%), while the low registered cases was reported at Al-Taleaa, and they are accounted 20(2.6%), table (1) and figure (2).

Age groups and Gender, were represented similarly individuals, since they are accounted non significant differences, table (1).

Regarding to item of residency, the majority of registration cases were reported at rural areas, and they are accounted 415(55%), table (1).

Finally, relative to item of education, the majority of registration cases were reported as illiterate, and they are accounted 452(59.9%), table (1).

The results showed that (60.7%) of patients were vaccinated with DPT vaccine. While, (39.3%) were unvaccinated children's with (DPT) vaccine, table (2).

Result shows that highly significant differences are registered at $P < 0.01$ throughout the periods (2009, 2012 and 2013) including total sample periods with positive assessment, since numbers of vaccinated children's are increases compared with those non vaccinated. In addition to that, and rather than non significant different at $P > 0.05$ for the contingency coefficient, since simply that P-value are not achieved, but it's more informative for that result to be reported, and so could be concludes that a meaningful differences are presented along the distribution periods of vaccinated status with positively assessment, table (3). Result shows that highly significant differences are registered at $P < 0.01$

throughout the sectors (AL- Midhatyia, and Al-Shomaly) including total sample sectors with a positive assessment, since the numbers of vaccinated children's are increases compared with those non vaccinated, and the leftover sector (Al-Hashimiya Center, Al- Qasim, and Al-Taleaa) had reported no significant differences at $P < 0.05$. Finally, contingency coefficient of measuring the association among vaccinated status outcomes along different of the studied sectors had reported highly significant correlation ship at $P < 0.01$, which indicated indeed that the studied sectors are differentiated with their vaccinated status assessment, table (4).

Table (1): Distribution of children demographical characteristics variables with comparison significant

Information about children	Classes	No.	%	C.S. (*) P-value
Year No. (Time Series)	2009	257	34	$\chi^2 = 140.3$ $P = 0.000$ HS
	2010	132	17.5	
	2011	54	7.2	
	2012	164	21.7	
	2013	148	19.6	
Al-Hashimiya District Sectors	Al-Hashimiya Center	58	7.7	$\chi^2 = 395.0$ $P = 0.000$ HS
	AL- Midhatyia	319	42.3	
	Al-Qasim	134	17.7	
	Al-Shomaly	224	29.7	
	Al-Taleaa	20	2.6	
Age Groups	Under 5 yrs.	398	52.7	Bin. test $P = 0.145$ (NS)
	5 yrs. and more	357	47.3	
Gender	Male	386	51.1	Bin. test $P = 0.560$ (NS)
	Female	369	48.9	
Residency	Urban	340	45	Bin. test $P = 0.007$ (HS)
	Rural	415	55	
Educational Levels	Illiterate	452	59.9	Bin. test $P = 0.000$ (HS)
	Primary	303	40.1	

(*) HS: Highly Sig. at $P < 0.01$

Bin. : Binomial test; χ^2 : Chi – Square test.

Figure (1): Bar charts for the percents of children demographical characteristics variables according to studied years

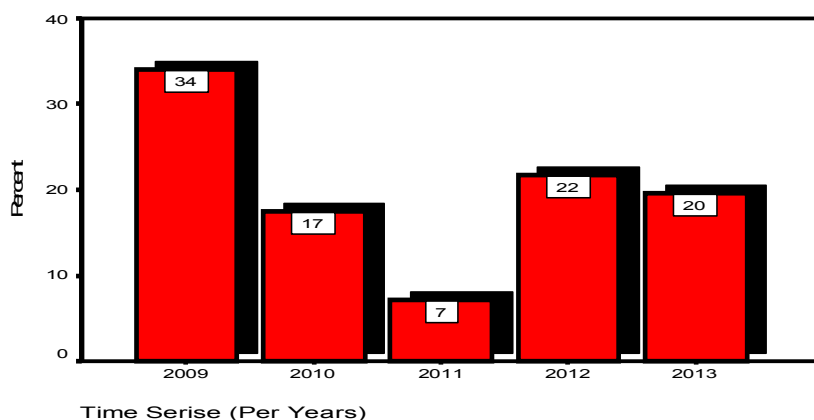


Figure (2): Bar charts for the percents of children demographical characteristics variables according to areas

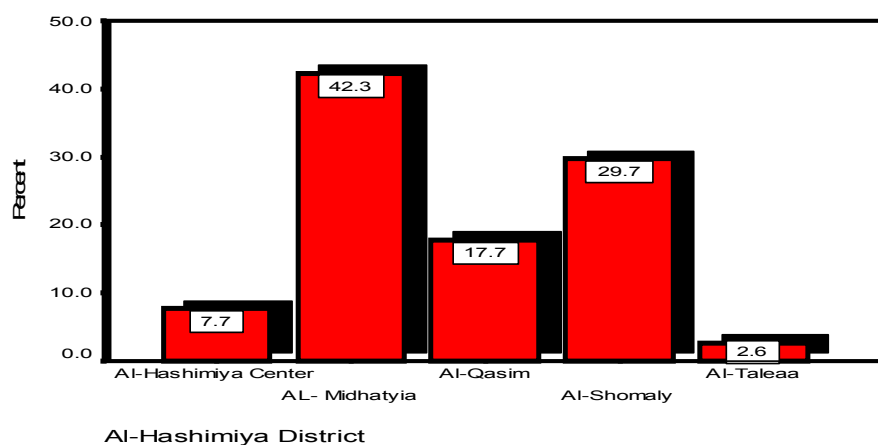


Table (2): Distribution of children vaccination status with comparison significant

Information about children vaccination	Classes	No.	%	C.S. (*) P-value
Are the child vaccinated with DPT : (Diphtheria - Pertussis - Tetanus) vaccine	Yes	458	60.7	Bin. test P=0.000 (HS)
	No	297	39.3	

Table (3):Responding of asking "Are the child Vaccinated with DPT Vaccine?"
distributed according to studied Periods withComparison Significant

Year No.	No. and Percents	Vaccinated Status		Total	C.S. (*) P-value
		Yes	No		
2009	No.	170	87	257	Bin. test P=0.000 (HS)
	% within Row	66.1%	33.9%	100%	
	% within Column	37.1%	29.3%	34%	
2010	No.	70	62	132	Bin. test P=0.542 (NS)
	% within Row	53.0%	47.0%	100%	
	% within Column	15.3%	20.9%	17.5%	
2011	No.	28	26	54	Bin. test P=0.892 (NS)
	% within Row	51.9%	48.1%	100%	
	% within Column	6.1%	8.8%	7.2%	
2012	No.	99	65	164	Bin. test P=0.010 (HS)
	% within Row	60.40%	39.60%	100.00%	
	% within Column	21.60%	21.90%	21.70%	
2013	No.	91	57	148	Bin. test P=0.007 (HS)
	% within Row	61.5%	38.5%	100%	
	% within Column	19.9%	19.2%	19.6%	
Total	No.	458	297	755	Bin. test P=0.000 (HS)
	% within Row	60.7%	39.3%	100%	
	% within Column	100%	100%	100%	
C.S. (*) P-value		C.C.= 0.104 P=0.082 (NS)			-

(*) HS: Highly Sig. at P<0.01

Bin. : Binomial test; C.C : Contingency Coefficient

Table (4) : Responding of asking "Are the child vaccinated with DPT vaccine?"
distributed according to studied areas with
comparison significant

City No.	No. and Percents	Vaccinated Status		Total	C.S. (*) P-value
		Yes	No		
Al-Hashimiya Center	No.	33	25	58	Bin. test P=0.358 (NS)
	% within Row	56.9%	43.1%	100%	
	% within Column	7.2%	8.4%	7.7%	
AL-Midhatyia	No.	195	124	319	Bin. test P=0.000 (HS)
	% within Row	61.1%	38.9%	100%	
	% within Column	42.6%	41.8%	42.3%	
Al-Qasim	No.	62	72	134	Bin. test P=0.437 (NS)
	% within Row	46.3%	53.7%	100%	
	% within Column	13.5%	24.2%	17.7%	
Al-Shomaly	No.	160	64	224	Bin. test P=0.000
	% within Row	71.4%	28.6%	100%	

% within Column		34.9%	21.5%	29.7%	(HS)
Al-Taleaa	No.	8	12	20	Bin. test P=0.503 (NS)
	% within Row	40.0%	60.0%	100%	
	% within Column	1.7%	4.0%	2.6%	
Total	No.	458	297	755	Bin. test P=0.000 (HS)
	% within Row	60.7%	39.3%	100%	
	% within Column	100%	100%	100%	
C.S. (*) P-value		C.C.= 0.184 P=0.000 : HS			-

(*) HS: Highly Sig. at $P < 0.01$

Bin. : Binomial test; C.C : Contingency Coefficient

Discussion

According to time (studied years) : table (1) and figure (1), showing that the majority of registered cases was reported at the first year (2009), and they are accounted 257(34%), this is because the pertussis is an endemic disease in Babylon and a possible defect in vaccination status of affected children may occur during this year such as drop out from vaccination. These results are in agreement with study of AL-Shammary M.A., in AL Diwaniya-Iraq (2010), he showed that a sharp rise in incidence was noted during the year 1996 with a highly significant difference than what were recorded four years before and four years after (P value < 0.01). A second sharp rise was noted during 2001, a third were during 2004 and a fourth rise during 2006[9].

In comparison with other study, this is coincide with the finding of Zouari A. et al., in Tunisia (2012), they stated that the year 2009 was marked by a statistically significant ($P = 0.0001$) increase in the number of diagnosed cases ($n = 74$) in comparison to the years 2008 and 2010 ($n = 34$ and $n = 5$) respectively[10].

Relative to item of (Al-Hashimiya District areas), in table (1) and figure (2), the majority of registered cases was reported at the AL- Midhatyia, and they are accounted 319(42.3%), while the

minority of registered cases was reported at Al-Taleaa, and they are accounted 20(2.6%). This is because AL-Midhatyia the largest area in Al-Hashimiya district regarding population and the trends of respiratory infections being related to urban highly populated areas. These results were comparable to study done by AL-Shammary M.A., in AL Diwaniya- Iraq (2010), he showed that the disease is more common in AL-Diwaniya Qada centre of the governorate (66.9%), while the percentage were less in Al-Hamza Qada (5.8%)[9].

Results of table (1), concerning gender (51.1%) were male, (48.9%) were female, there were no significant differences, because pertussis disease affect both genders. These results are strongly agree with results of Muhsin M.A., in Babylon-Iraq(2009), who stated that there were no significant differences between male and female in all age groups, 40 (53%) were male, 35 (47%) were female [11]. Additionally, Al-Azzawi D.S., in Diyala-Iraq (2011), found that the cases of whooping cough were equally affect both genders[12], this result in agreement with the result of this study.

Results of table (1), according to age groups under 5 years were (52.7%), 5 years and more were (47.3%), there were no significant differences, because this age groups is still the population at the

highest risk. Study of AL-Shammary M.A., in AL Diwaniya- Iraq (2010), he found children under five years(75,29%) are the mostly affected with pertussis disease [9], which strongly agree with this study concerning age groups.

Results of table (1), regarding to item of residency, the majority of registered cases were reported in rural areas, and they are accounted 415(55%). this is because the rural community were impoverished to the health education toward infectious diseases and vaccinations, in addition the majority rural families ignored to vaccinated their children's, these finding were comparable with the results of Muhsin M.A., in Babylon-Iraq (2009), in their study found that (83%) of patients reported as a rural area resident of Babylon province compared with (17%) lived in urban areas[11].

Finally results of table (1), relative to item of education, the majority of registration cases were reported as illiterate, and they are accounted 452(59.9%). This is because the sample size of this study included numbers of infants and preschool age children more than schools age children's. So, this result supported by studyde Greeff S.C. et al., in Netherlands (2009), he found no evidence for a relationship between annual rises in pertussis and the starting of schools[13].

According to vaccination status of infected children's: The results of table (2) and figure (3), showed that (60.7%) of patients were vaccinated with DPT vaccine. While, (39.3%) were unvaccinated children with (DPT) vaccine, this is because fully vaccinated and partial vaccinated children wrongly admixed together, and don't know how many doses of (DPT) vaccine to identify partial vaccinated group(mistake in recording by health personnel).

This result in agreement to the results of Harnden A. et al., in England (2006), who reveals that a study of 172 cases , 64 patients (37%) had evidence of recent B. Pertussis infection, 55

patients (85.9%) of these children had been fully vaccinated[14]. The present findings were comparable with Winter K. et al., in California (2012), they found of 4415 (76%) pediatric cases in infants aged 6 months through 18 years with vaccination information, 380 (9%) were completely unvaccinated against pertussis and 1621 (37%) had not received one or more recommended pertussis vaccine doses, 2414 (55%) were reported to be fully immunized[15], which strongly in agreement with the present study.

Additionally, study of Carde~nosa N. et al., in Catalonia - Spain (2009), they found of the total vaccine status documented cases, 59 (73.8%) patients received at least one dose [16], which approximately had some correspond with the present study.

On basis of the findings of study: concerning table (3), the relationship according to studied periods results revealed that highly significant differences are registered at $P < 0.01$ throughout the years (2009, 2012, and 2013). While, results of table (4), the relationship according to studied sectors shows that highly significant differences are registered at $P < 0.01$ throughout the areas (AL- Midhatyia, and Al-Shomaly). This results of the present study, which is for the first time studied in such aspects. Unfortunately, no supportive evidence similarly for this results is available in the literatures for comparison.

Conclusions

1. Spread of pertussis cases in Al-Hashimiya district which have been clinically diagnosed, despite the existence of a vaccine against the disease.
2. Spread of pertussis cases in rural areas more than urban areas, especially in children's at age 5 years or less, although the most of them vaccinated against the disease.
3. Most pertussis patients are the dropouts children from vaccinations or

children's partially vaccinated against the disease.

Recommendations:

1. Implementation of vaccinations campaigns against the disease for the dropouts children's, especially in rural areas.
2. Adoption(DTaP)vaccine instead of the vaccine(DTwP) for the children's at age 5years or less in the Expanded Program on Immunization.
3. Contacts who are over the age of (7) years should be receive a single dose of (Tdap) as: adolescents, elderly, pregnant and health workers.

References

- 1)Peter M. Strebel, Dalya Guris and Steven G. F. Wassilak., Pertussis. In: Maxy, Rosenau and Last. Public Health & Preventive Medicine. Appleton& Lange. 14th ed.,1998; P:98-102.
- 2)Duclus P., Pertussis. In: David L. Heymann. Control of communicable Diseases manual. American public health association. 18th ed., 2004; P: 399-404.
- 3)Jawetz, Melnick, and Adelbergs ., Medical Microbiology. Lange medical book. McGraw-Hill companies. 23rd ed., 2004; P:282-284.
- 4)Department of Health and Human Services, Centers for Disease Control and Prevention (CDC)., Pertussis. In: Atkinson W, Wolfe C, Hamborsky J, McIntyre L, eds. Epidemiology and prevention of vaccine-preventable diseases. 11th ed. Washington DC: Public Health Foundation , 2009; P:199-216.
- 5)Sarah S. Long, Robert M. Kliegman ,Richard E. Behrman ,Hal B. Jenson and Bonita F. ,Nelson text book : Stanton. Saunders, an imprint of Elsevier Inc, Vol.(194), 2007; P:1178-1182.
- 6)Cherry JD., Grimprel E., Guiso N., Heininger U. and Mertsola J. , Definingpertussis epidemiology clinical, microbiologic and serologic

perspectives. Pediatric Infect Dis J, Vol.(24), 2005; P:25–34.

7)Crowcroft NS., Stein C., Duclos P. and Birmingham M., How best to estimate the global burden of pertussis? Lancet Infect Dis. Vol.(3), No.(7) 2003; P:413–418.

8)World Health Organization (WHO)., Pertussis vaccines: WHO position paper. Wkly Epidemiol Rec ,Vol.(85), 2010; P:385-400.

9)AL-Shammary M. A.A., The descriptive epidemiology of Pertussis in AL-Diwaniya governorate for the years 1990 through 2007. published in Kufa Med. Journal, Iraq, VOL.(13), No.(2), 2010.

10)Zouari A. and et al., Prevalence of Bordetella pertussis and Bordetella parapertussis infections in Tunisian hospitalized infants: results of a 4-year prospective study. Diagnostic Microbiology and Infectious Disease, Tunis, VOL.(72), 2012.

11)Muhsin M.A., Al-Tufaili Y.A.A. and Shalan A.A., The Epidemiological profiles of hospitalized pertussis patients in Babylon province. published in Kufa Med. Journal, Iraq, VOL.(12), No.(2), 2009. Available at: www.iasj.net/iasj?func=issues&jId=117&uiLanguage=ar.

12) Al-Azzawi D. S., Obaid K. A. and Mahmoud N.S., Incidence of whooping cough in Diyala province, Iraq. Vol. (6), No.(4), 2011.

13)de Greeff S.C., Dekkers A.L.M., Teunis P., Rahamat-Langendoen J.C., Mooi F. R., de Melker H.E., Seasonal patterns in time series of pertussis., Epidemiol Infect, Vol.(137), 2009; P:1388-1395.

14)HarndenA. and et al.,Whooping cough in school age children with persistent cough: prospective cohort study in primary care. BMJ, England, Vol. (333), 2006.

15)Winter K. and et al., California Pertussis Epidemic, 2010. THE JOURNAL OF PEDIATRICS, Vol. (161), No.(6), 2012.

16)Cardēnosa N. and et al., Is the vaccination coverage established enough to control pertussis, or it is a re-emerging

disease?. Vaccine, Vol. (27), 2009; P: 3489–3491.