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

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**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 2009- 2013**

**الخلاصة**

 تهدف هذه الدراسة لمعرفة حدوث مرض السعال الديكي والحالة المناعية للاطفال المصابين بالمرض للسنوات من 2009-2013 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 9 كانون الثاني 2014 ولغاية 10 مارس 2014.عينة الدراسة بلغت (755) حالة من الاطفال المصابين بمرض السعال الديكي.
      أشارت النتائج في هذه الدراسة بأن اغلبية الحالات المرضية سجلت خلال العام 2009 وكانت 257(34%), وأكثرها سجلت في منطقة المدحتية حيث كانت 319 (42.3%), بخصوص الفئات العمرية والجنس لم يظهر وجود اختلاف معنوي بينهما,في حين اعلى نسبة من الحالات سجلت في مناطق الارياف وكانت 415 (55%), وكانت اغلبية الحالات المسجلة ضمن المستوى التعليمي (الاميين) حيث كانت 452(59.9%). الدراسة الحالية اظهرت بان 458 (60.7%) من المرضى كانوا ملقحين باللقاح الثلاثي DPT)). وكشفت هذه الدراسة وجود اختلافات معنوية كبيرة تم تسجيلها (P<0.01) بشأن العلاقات بين الأطفال الملقحين باللقاح الثلاثي وفقا لبعض المتغيرات ذات الصلة المتمثلة ( بالسنوات ومناطق قضاء الهاشمية).

**Introduction**

P

ertussis 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 wand 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 of5 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.Satistical analysis of this study by ( SPSS) version (10), which include : Chi-squre, Binomial test, Contengency 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 | χ2= 140.3P=0.000HS |
| 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 | χ2= 395.0P=0.000HS |
| 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. testP=0.145 (NS) |
| 5 yrs. and more | 357 | 47.3 |
| Gender | Male | 386 | 51.1 | Bin. testP=0.560 (NS) |
| Female | 369 | 48.9 |
| Residency | Urban | 340 | 45 | Bin. testP=0.007 (HS) |
| Rural | 415 | 55 |
| Educational Levels | Illiterate | 452 | 59.9 | Bin. testP=0.000(HS) |
| Primary | 303 | 40.1 |

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

Bin. : Binomial test; χ2 : 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. testP=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. testP=0.000 (HS) |
| % within Row | 66.1% | 33.9% | 100% |
| % within Column | 37.1% | 29.3% | 34% |
| 2010 | No. | 70 | 62 | 132 | Bin. testP=0.542 (NS) |
| % within Row | 53.0% | 47.0% | 100% |
| % withinColumn | 15.3% | 20.9% | 17.5% |
| 2011 | No. | 28 | 26 | 54 | Bin. testP=0.892 (NS) |
| % within Row | 51.9% | 48.1% | 100% |
| % withinColumn | 6.1% | 8.8% | 7.2% |
| 2012 | No. | 99 | 65 | 164 | Bin. testP=0.010 (HS) |
| % within Row | 60.40% | 39.60% | 100.00% |
| % withinColumn | 21.60% | 21.90% | 21.70% |
| 2013 | No. | 91 | 57 | 148 | Bin. testP=0.007 (HS) |
| % within Row | 61.5% | 38.5% | 100% |
| % withinColumn | 19.9% | 19.2% | 19.6% |
| Total | No. | 458 | 297 | 755 | Bin. testP=0.000 (HS) |
| % within Row | 60.7% | 39.3% | 100% |
| % withinColumn | 100% | 100% | 100% |
| C.S. (\*)P-value | C.C.= 0.104P=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. testP=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. testP=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. testP=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. testP=0.000 (HS) |
| % within Row | 71.4% | 28.6% | 100% |
| % within Column | 34.9% | 21.5% | 29.7% |
| Al-Taleaa | No. | 8 | 12 | 20 | Bin. testP=0.503 (NS) |
| % within Row | 40.0% | 60.0% | 100% |
| % within Column | 1.7% | 4.0% | 2.6% |
| Total | No. | 458 | 297 | 755 | Bin. testP=0.000 (HS) |
| % within Row | 60.7% | 39.3% | 100% |
| % within Column | 100% | 100% | 100% |
| C.S. (\*)P-value | C.C.= 0.184P=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 droup 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<0.01throughout 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.

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