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MAIN ARTICLE

A longer stay for the kissing disease: epidemiology of bacterial tonsillitis and infectious mononucleosis over a 20-year period

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Abstract

Introduction: Anecdotally, infectious mononucleosis is considered a more severe infection than bacterial tonsillitis, requiring a longer hospital stay. However, there is little in the literature comparing the epidemiology of the two conditions. This study aimed to compare the epidemiology of bacterial tonsillitis and infectious mononucleosis, in particular any differences in the length of in-patient stay.

Methodology: The hospital in-patient enquiry system was used to analyse patients admitted with bacterial tonsillitis and infectious mononucleosis between 1990 and 2009 inclusive.

Results: There was a total of 3435 cases over the 20 years: 3064 with bacterial tonsillitis and 371 with infectious mononucleosis. The mean length of stay was 3.22 days for bacterial tonsillitis and 4.37 days for infectious mononucleosis. The median length of stay for each condition was compared using the Mann–Whitney U non-parametric test, and a significant difference detected ($p < 0.001$).

Conclusion: Patients with infectious mononucleosis have a significantly longer stay in hospital than those with bacterial tonsillitis.

Key words: Tonsillitis; Infectious Mononucleosis; Length of Stay; Epidemiology

Introduction

Epstein–Barr virus (EBV) is one of the most common viral infections in humans.[1] In childhood, the disease is usually subclinical, and early infection is associated with poor hygiene and over-crowding. In lower socio-economic groups, most of the population will have acquired immunity by adolescence.[2]

Epstein–Barr virus infection of adolescents or adults results in infectious mononucleosis in up to 70 per cent of cases and can prove severe.[3] Improved housing and smaller family sizes may have led to a change in the epidemiology of EBV and therefore of infectious mononucleosis. Acquisition of EBV is often delayed in more affluent social classes, resulting in increased prevalence of hospital admission compared with lower socioeconomic status groups.[4] Recently, a general increase in hospital admissions for infectious mononucleosis has been documented.[3,5]

Anecdotally, infectious mononucleosis is considered to be a more severe infection than bacterial tonsillitis, thus requiring a longer stay in hospital; however, there is no evidence in the literature to support this.

This study aimed to compare the duration of hospital admission of patients admitted with severe bacterial tonsillitis versus infectious mononucleosis.

Methods

A retrospective analysis was undertaken covering the years 1990–2009 inclusive.

We compared hospital admissions for bacterial tonsillitis and for infectious mononucleosis at the University Hospital Limerick, Ireland. Epidemiological information was acquired from the hospital Patient Enquiry System. We included patients coded for emergency admission with infectious mononucleosis or bacterial tonsillitis and admitted to the otolaryngology department. The indications for admission were inability to take oral antibiotics, airway management, requirement for intravenous rehydration, or lack of response to oral therapy.

Bacterial tonsillitis is often diagnosed clinically. If infectious mononucleosis is suspected, in accordance with the Hoagland criteria, a patient with fever, pharyngitis, lymphadenopathy and lymphocytosis can have

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their diagnosis confirmed by positive serological testing.[6,7]

We excluded patients younger than 15 years as they were primarily treated by the paediatric service.

Hospital admissions data were compared for patients admitted with infectious mononucleosis and with acute tonsillitis. Patients with peritonsillar abscess were excluded. We recorded incidence and length of stay as well as patient age and sex.

Data were analysed using the Mann–Whitney U non-parametric test, Fisher's exact test, the chi-square test and the non-parametric Kruskal–Wallis test. Statistical analysis was performed by the Statistical Consulting Unit at the Graduate Entry Medical School, University of Limerick.

Incidence rates were calculated using population figures (divided by county) derived from census data for the 20-year study period, provided by the Central Statistics Office, Ireland.[8] The University Hospital Limerick serves mid-western counties including Limerick, Clare and North Tipperary.

Results

There was a total of 3435 cases over the 20-year study period: 3064 bacterial tonsillitis cases and 371 infectious mononucleosis cases.

Incidence rates were calculated for the total mid-western population as follows. For infectious mononucleosis, there were 1.6 cases per 100 000 requiring hospital admission in 1990, and 5.5/100 000 in 2009. The highest incidence of infectious mononucleosis occurred in 2000, with 7.8 admissions per 100 000 population. For bacterial tonsillitis, there were 27/100 000 cases in 1990 and 45/100 000 in 2009. The highest incidence of bacterial tonsillitis occurred in 2001, with 64 admissions per 100 000 population (Figure 1).

The mean age for bacterial tonsillitis cases was 25.7 years, with a median age of 22 years, standard deviation (SD) of 11.06 years and range of 15–87 years. The mean age for infectious mononucleosis cases was 20.0 years, with a median age of 18 years, SD of 6.32 years and range of 15–70 years. The distributions of age for both conditions were positively skewed. The median ages for the conditions were compared using the Mann–Whitney U non-parametric test, and a statistically significant difference was found ($p < 0.001$): the median age of infectious mononucleosis patients was significantly lower than that of bacterial tonsillitis patients (Figures 2 and 3).

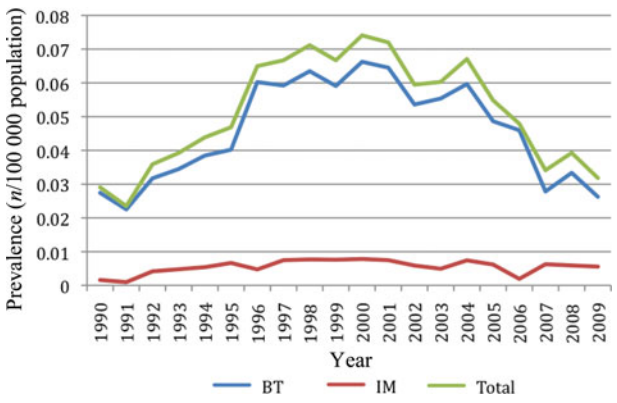

FIG. 1
Prevalence of bacterial tonsillitis and infectious mononucleosis.

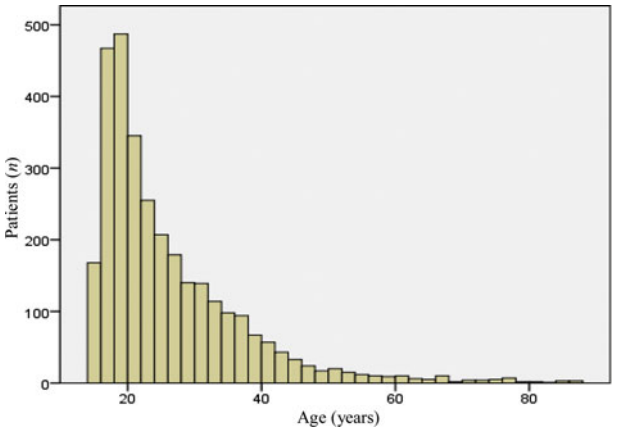

FIG. 2
Age distribution for bacterial tonsillitis. Mean age = 25.68 years, standard deviation = 11.062 years, $n = 3064$ patients.

The distribution of gender in each disease group was compared using Fisher's exact test, and no statistically significant difference found ($p = 0.098$). However, this result showed a substantial trend: a larger percentage of females was noted in the bacterial tonsillitis group, and a larger percentage of males in the infectious mononucleosis group.

Length of stay was also compared for the two diseases. Again, the distribution of length of stay was positively skewed for both diseases. The mean length of stay for bacterial tonsillitis was 3.22 days, with a median of 3 days, SD of 1.54 days and range of 1–19 days. The mean length of stay for infectious mononucleosis was 4.37 days, with a median of 4

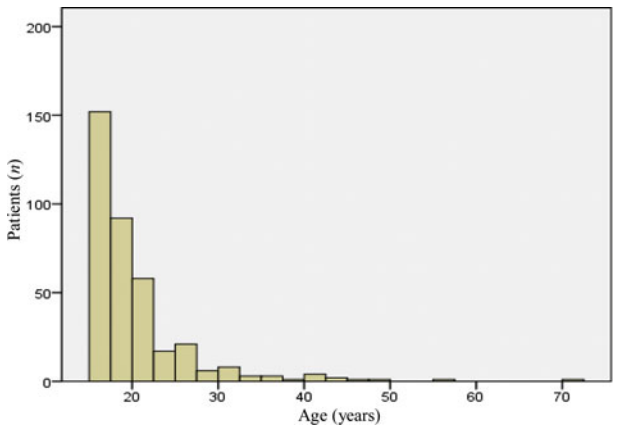

FIG. 3
Age distribution for infectious mononucleosis. Mean age = 19.95 years, standard deviation = 6.323 years, $n = 371$ patients.

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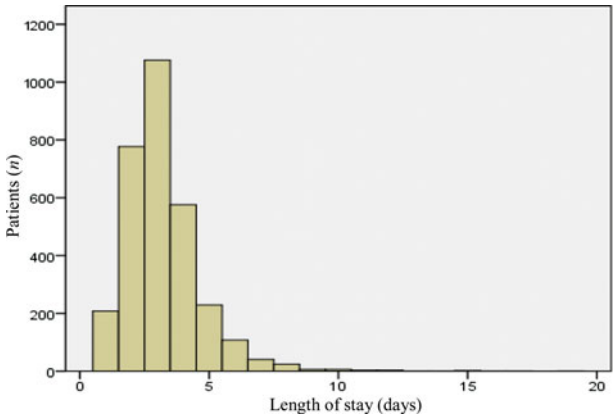

FIG. 4

Length of stay for bacterial tonsillitis patients. Mean length of stay = 3.22 days, standard deviation = 1.539 days, $n = 3064$ patients.

days, SD of 2.37 days and range of 1–15 days. The median length of stay for the two diseases was compared using the Mann–Whitney U non-parametric test, and a statistically significant difference found ($p < 0.001$): the median length of stay of bacterial tonsillitis patients was significantly shorter than that of infectious mononucleosis patients (Figures 4 and 5).

The mean length of stay differed significantly between patients of different ages ($p < 0.001$): older patients tended to stay longer. Again, mean length of stay tended to be longer for those with infectious mononucleosis compared with bacterial tonsillitis (Figure 6).

Discussion

The incidence of infectious mononucleosis hospital admissions increased over the 20-year study period, from 1.6/100 000 to 5.5/100 000. It peaked in the late 1990s and early 2000s, and the mean overall incidence was 5.4/100 000 (Figure 7). This compares to an admission rate of 4.2/100 000 in England between 1998 and 2005.[9] A rise in hospital admissions for

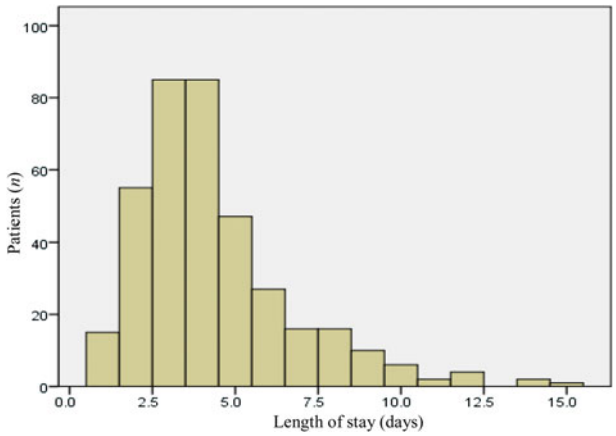

FIG. 5

Length of stay for infectious mononucleosis patients. Mean length of stay = 4.37 days, standard deviation = 2.374 days, $n = 371$ patients.

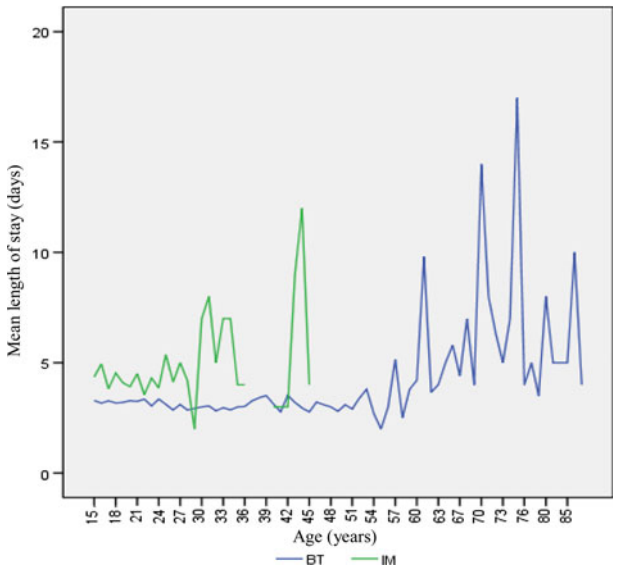

FIG. 6

Patients' mean length of stay by age. BT = bacterial tonsillitis, IM = infectious mononucleosis

infectious mononucleosis has also been noted in England and Wales combined, from 2.6/100 000 in 1989 to 4.8/100 000 in 1998.[5] Decreasing general practitioner visits, especially amongst the young, together with rising hospital admissions led Morris *et al.* to conclude that the most likely explanation for the observed pattern was that falling childhood infection rates had resulted in increased numbers of teenagers being susceptible to severe primary infection.[5] Childhood EBV infection is associated with low socioeconomic status, so the Irish economic boom from the mid-1990s to the late 2000s may have altered the epidemiology of EBV and therefore of infectious mononucleosis.[4,10,11] However, it is likely that both our report and that of Morris *et al.* have too short a lag phase to predict a continuing rise in infectious mononucleosis incidence.

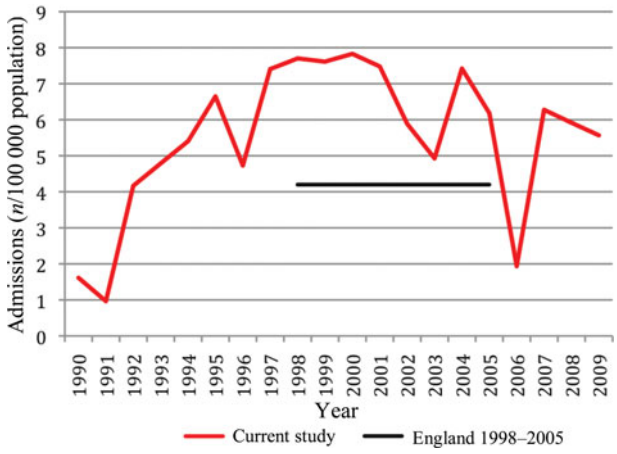

FIG. 7

Hospital admissions for infectious mononucleosis: comparison of current study with English data.

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We found that patients admitted with infectious mononucleosis were significantly younger than those admitted with bacterial tonsillitis. In developed countries, the highest incidence of infectious mononucleosis is in the 15–25 year-old age group.[12] Therefore, a mean age of incidence of 20 years is in line with other reports of infectious mononucleosis epidemiology. A mean age of 18.3 years was found in Wisconsin in 1961, and 19.3 years in Norway in 1978.[12–14] One report found a slightly younger mean age for females than males (17.0 years for females, 19.5 years for males); the author attributed this to earlier maturity in females.[15] Infectious mononucleosis is more likely to occur earlier in developing countries.[16] It is rare in the elderly; a review of the 1968–1987 literature found just 29 cases in patients over 60 years.[17,18] In our cohort, only one infectious mononucleosis patient (in 371 cases) was over 60 years of age.

The mean age of patients admitted with bacterial tonsillitis was 25.7 years. Although bacterial tonsillitis is most commonly diagnosed in children aged 5–15 years, adults admitted with this condition tend to be older than adults admitted with infectious mononucleosis.[19] For adult bacterial tonsillitis patients, mean ages of 27.3 and 27.7 years have been published.[20,21] Another paper reported a significantly lower mean age for adult infectious mononucleosis patients (23 years) compared with adult bacterial tonsillitis patients (27 years).[22]

Although not statistically significant, we noted a larger percentage of females in the bacterial tonsillitis group and a larger percentage of males in the infectious mononucleosis group. In contrast, a recent paper found a larger percentage of females amongst infectious mononucleosis patients, although this difference in gender distribution was not significant.[23] Overall, infectious mononucleosis seems to occur equally in both sexes.[12]

In the current study, the mean length of stay was found to be significantly longer for infectious mononucleosis patients (4.37 days, with a median of 4 days) compared with bacterial tonsillitis patients (mean of 3.22 days, median of 3 days). These results for infectious mononucleosis are similar to previous reports; a 2005 study reported a mean length of stay of 4.6 days.[24] However, a Hungarian paper reported a mean length of stay for infectious mononucleosis patients which was more than double that of our patients, at 9.2 days.[25] Raw data from the UK National Health Service for 2009–2010 indicate a mean length of stay of 2.2 days for infectious mononucleosis patients and 1 day for acute tonsillitis patients.[26] The latter figure is not likely to represent severe bacterial tonsillitis; however, there is little in the literature regarding the length of stay of bacterial tonsillitis patients. One 1975 report from Maine, USA, gave a mean length of stay of 3.28 days.[27] Infectious mononucleosis in patients over 40 years often presents with atypical signs and symptoms, and patients' hospital stay can therefore be longer.[28]

The longer duration of hospitalisation in infectious mononucleosis patients may be because this condition is generally treated supportively, as it is a viral infection. Acyclovir has been shown to be ineffective in treating the symptoms of infectious mononucleosis.[29] Steroids have been shown to be of benefit only for cases of upper airway obstruction, and do not decrease the length of stay.[24] As a bacterial disease, tonsillitis is most commonly limited to the pharynx, whilst infectious mononucleosis is a systemic disease. Patients with infectious mononucleosis have been shown to be more susceptible to bacterial tonsillar infection, in particular by anaerobic bacteria.[30–32] This has led to some centres treating infectious mononucleosis with metronidazole, and several studies have demonstrated faster acute and long-term recovery of infectious mononucleosis patients thus treated.[33–37] Infectious mononucleosis can also be more difficult to diagnose, with associated delayed treatment and increased risk of severe complications, compared with bacterial tonsillitis.[7]

Physicians and hospital managers are increasingly under pressure to monitor and improve economic performance. Data on length of stay are increasingly being used to monitor hospitals' economic performance.[38] Increased length of stay is associated with higher cost per patient.[39] In many countries, the expected length of stay is used as a health indicator denoting efficiency.[40] In this economic environment, it is thus important to note the significant difference between the length of stay of infectious mononucleosis and bacterial tonsillitis patients found in the current study.

- **Infectious mononucleosis is a differential diagnosis of bacterial tonsillitis**
- **Anecdotally, infectious mononucleosis is more severe than bacterial tonsillitis**
- **This study found an increasing incidence of infectious mononucleosis**
- **Of hospitalised patients, infectious mononucleosis cases were younger than bacterial tonsillitis cases**
- **Infectious mononucleosis patients stayed longer in hospital**

The current study's strengths lie in the fact that: (1) it was a 20-year study from a single institution, which compared large numbers of commonly treated diseases; and (2) data were obtained from a single hospital Patient Enquiry System, and were statistically analysed by a consultant biostatistician from the University Medical School. The study's weaknesses include: (1) lack of identification of readmissions; and (2) treatment of both infectious mononucleosis and bacterial tonsillitis by a large number of different physicians over the 20-year study period, during which time different treatment regimes may have been used. Also, the study relied on the accuracy of the hospital Patient Enquiry System.

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Conclusion

This was a large epidemiological study conducted over a 20-year period. There are few studies of infectious mononucleosis in the recent literature, and none comparing infectious mononucleosis with bacterial tonsillitis. Our results concur with those of many other studies as regards the incidence, age and sex distribution of infectious mononucleosis and bacterial tonsillitis. Furthermore, we noted a trend towards an increasing incidence of infectious mononucleosis over time. Our results demonstrate, for the first time, that infectious mononucleosis is indeed a more severe infection than bacterial tonsillitis, requiring a significantly longer length of stay in hospital.

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