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Patterns of hospital attendance with epistaxis*

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SUMMARY *The age and sex distribution of epistaxis admissions to hospital was examined. A retrospective analysis of 6,885 patients admitted to hospitals in the whole of Wales was performed, over a period of five years. The findings were compared with data from the 1991 National Population Census for the same region, thus providing a more representative estimate of the behaviour of this disease. A clear age relationship is demonstrated, with the incidence of epistaxis increasing rapidly after the age of 40 years. The female-to-male ratio is also age dependent. In the group aged between 20 to 49 years twice as many males as females were admitted, where no sex difference was expected from the population data. This difference was not present in the group aged 50 years and over where the ratio was similar to that in the underlying population. There was a 1.6 fold difference between the sex ratios of the two groups (95% confidence intervals of 1.9 to 1.4; p<0.0001). It is possible that the female pre-menopausal state may provide a significant protection from this disease. The mechanism for this is unknown, but may be secondary to a direct effect of oestrogen on the nasal mucosa or vasculature, or the healing of vessels in this region. Alternatively, this observation may simply be a reflection of protection the pre-menopausal state provides against cardiovascular disease in general.*

Key words: epistaxis, epidemiology, incidence, gender, menopause

INTRODUCTION

Epistaxis is an extremely common condition and is the most frequent emergency seen in otolaryngology. In some cases the cause of an episode of epistaxis can be identified, but in the majority of cases it remains unclear. Although there is an enormous amount of literature on this subject, little of it is devoted to the further understanding of the aetiology or the epidemiology of this condition. The aim of this study was to clarify the age and sex distribution of severe epistaxis. Although previous authors have addressed this issue (Jesulius, 1974), no attempt has been made to place the findings in the context of the underlying population and this may have produced an inaccurate representation of the problem.

METHODS

Individual patient data supplied by the Welsh Health Common Services Authority, on a total of 6,885 patients with epistaxis sufficiently severe to warrant hospital admission, was examined for a 5-year period, between 1 January 1988 and 31 December 1992. The admission patterns in respect to date of admission, age and sex, were studied.

Data on the underlying population, taken from the 1991 Population Census was used as a comparison to achieve a more representative estimation of admission patterns.

RESULTS

Age distribution

Figure 1 shows the raw admission data divided into 5-year intervals. The crude age data has a bimodal distribution. A paediatric peak, between 5 and 15 years of age, and a later, much larger, peak at between 65 and 85 years of age can be seen. Figure 2 illustrates the epistaxis rate expressed as a proportion of the underlying population in each age band. This is given by the actual number of patients admitted in that age group divided by the population of that same age group. Apart from a small increase between the age of 5 and 20 years, the incidence of epistaxis appears relatively stable until the age of 40 years, after which the rate of admission rapidly increases.

Gender

Figure 3 shows the age corrected female/male ratios for each 5-year age band, with corresponding 95% confidence intervals. Apart from the paediatric age group, there appears to be an

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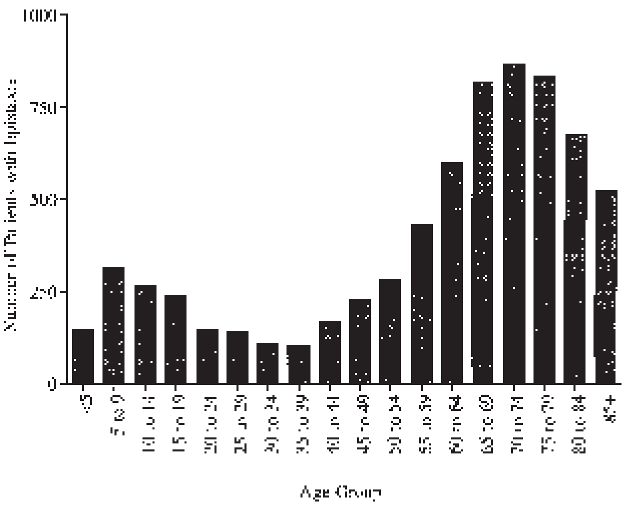

Figure 1. The distribution of the population of patients admitted with epistaxis is shown, divided into 5-year age bands.

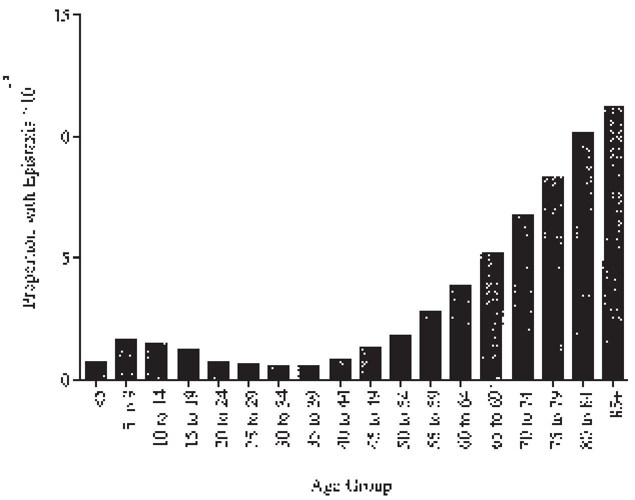

Figure 2. The distribution of the population of patients admitted with epistaxis is illustrated when the admission rate is expressed as a proportion of the underlying population in each 5-year age band. This proportion is given by number of admissions in each age group divided by the population of that age group (compare with Figure 1).

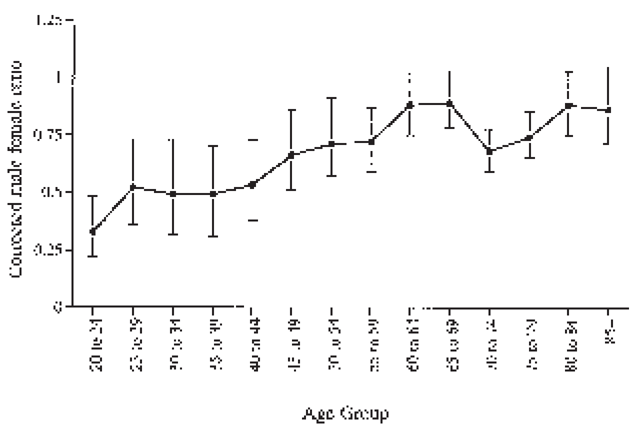

Figure 3. The corrected male/female age ratios for each age band in the adult patients is shown with their corresponding 95% confidence intervals (Miettinen, 1985).

upward trend, but with a considerably lower admission rate in females during their reproductive years, when compared to males of the same age. In the adult patient population there appears to be a difference in the sex ratio in early adult life and middle age that is not present in later life.

If the adult population is divided into a 20-50 and an over-50 age group, so as to approximately reflect female reproductive status, a clear pattern emerges. This is shown in Table 1 with their corresponding crude female/male ratios.

Table 1. The actual number of adult patients admitted with epistaxis is shown together with the expected number of patients (in parentheses) calculated from the detailed structure of the underlying population. These are divided into two age groups, 20-50 and over-50, and also divided for sex. The ratio of female to male is also shown for each age group. There is a crude 2.27 fold difference between the two age groups. The corrected age ratio is 1.59 (95% confidence intervals 1.85 to 1.37; $p<0.0001$, z test).

age group	20-50 years	>50 years
female	301 (450.24)	2,683 (2,963.08)
male	595 (445.76)	2,340 (2,059.92)
totals	896 (896)	5,023 (5,023)
ratio female/male	0.51 (0.99)	1.15 (1.25)

There is a 2.27 fold difference in the sex ratios of the 20-50 and the over-50 age groups. The 95% confidence interval for this figure are 2.63 to 1.95, calculated according to the method of Woolf (1955). This crude ratio, however, does not take account the age structure of the population from which these patients came.

An appropriate correction factor can be calculated from the number of expected admissions for males and females in the 20-50 and over-50 age groups. Summing the expected number of admissions for each 5-year age band, within these groups, gives the total expected admissions for each sex. The correction factor is then given by:

$$\frac{\text{Expected (female} \geq 50) / \text{Expected (male} \geq 50)}{\text{Expected (female 20-50)} / \text{Expected (male 20-50)}} = 1.42$$

Thus, a corrected ratio would be given by $2.27/1.42 = 1.59$, with a 95% confidence interval for this ratio of 1.85 to 1.37 ($p<0.0001$, z test; cf., Woolf, 1955).

The age-corrected female/male ratio for each age band in the entire adult group is shown in Figure 3, the confidence intervals for each data point have been included (Miettinen, 1985).

DISCUSSION

This study confirms some of the previously held beliefs regarding the admission patterns of epistaxis. However, other features of this condition are apparent that smaller studies have failed to show.

Age distribution

The crude admission pattern shown in Figure 1 is similar to that noted by previous authors (Jesulius, 1974; Shaheen, 1975), however, if the number of admissions with epistaxis is presented as a proportion of the underlying population, as in Figure 2, a rather different picture emerges.

It appears that in later life some factor, or factors operate to cause a rapid increase in epistaxis admissions with age. Shaheen (1975), for example, has shown a progressive degeneration in the tunica media of medium-sized blood vessels in the nose, with increasing age and much work has focused on the relationship between the levels of the various components of the haemostatic system and its relationship to cardiovascular disease. An age-dependent increase in Factors VIIc and VIIIc as well as fibrinogen has been shown (Balleisen et al., 1985). Although at first sight this may appear contradictory when attempting to explain the increase in epistaxis with age, it should be remembered that, firstly, the pathophysiology of thrombus development within an intact vessel lumen may differ from clot formation at a site of vessel wall rupture and, secondly, the physiology of the nasal vasculature is quite different from that of the coronary arteries.

It seems likely that the increase in epistaxis admissions seen with age is a combination of the degenerative changes in the nose, possibly associated with age-dependent changes in the haemostatic system.

Gender

The most surprising fact to emerge from this study is that in the adult age group a marked difference is seen between the admission rates of males and females, and furthermore this difference is only present between the ages of 20 and 50 years (Table 1). In this group twice as many males as females are admitted, and this pattern changes in the over 50 group where the male to female ratio approaches that expected from the population.

It is tempting to hypothesize that the hormonal status of premenopausal females affords a degree of protection against epistaxis, as has been reported in cardiovascular disease (Kannel et al., 1976). However, it may also be argued that differences in the social behaviour of males and females in this age group may make other causes of epistaxis more common in males, such as nasal trauma. Alternatively, the presence of a more stoical nature amongst the young female population in the area under study, may make them less likely to present themselves to hospital.

Jesulius (1974) presented a study of 1,724 hospital admissions with epistaxis in Finland, the age and sex distribution of patients included in this study are remarkably similar to that of this study. Although the paper itself does not discuss the relationship of gender to epistaxis admissions, a similar sex difference is present, female/male ratio in the 20-50 age group is 0.4, and in the over-50 age group it is 0.9. Trauma was identified as a cause in only 2.7% of the total number of patients. The largest single identifiable cause was cardiovascular disease and this fact has also been noted by other authors (Hallberg, 1952; Woolf and Jacobs, 1961)

It is possible that not all young females, at any one time, share the same degree of protection and that the findings reflect the presence of a subgroup or subgroups within this population that are less likely to experience severe epistaxis. Such subgroups may include regular users of the contraceptive pill, those who are pregnant, or those at the varying stages of the menstrual cycle. All of these states are known to be associated with changes in levels of components of the clotting cascade. Healthy menstruating females have a significantly lower level of fibrinogen than males and this difference disappears in the third decade; furthermore, these levels are dependent on the phase of the menstrual cycle (Wallmo et al., 1982). Levels of both Factor VII and fibrinogen are directly related to the dose of oestrogen in the contraceptive pill (Bonnar, 1987), and pregnancy is associated with an increased level of several haemostatic factors, including Factor VII and fibrinogen (Foley et al., 1984; Blomback et al., 1992). In addition, these states may have a local effect on the nose. Both oral contraception, and pregnancy have been reported to cause changes in the nasal mucosa (Sorri et al., 1980; Toppozada et al., 1984). Furthermore, oestrogens appear to have an effect on the rate of healing of damaged endothelial cells (Morales et al., 1995), and may have a more direct effect on wound healing.

If one accepts the possibility that hormonal sex differences may be responsible for the above findings, a possible explanation may be found in either the response of the haemostatic system or the nasal mucosa itself to the changing levels of female sex hormones throughout life. Alternatively, the findings may simply reflect an association of epistaxis with cardiovascular disease. A large prospective study would be needed to clarify this.

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