

A 7 year pollen profile of major Olympic Games venues in Sydney, Australia

Constance Helen Katelaris* & Therese Valerie Burke

Department of Clinical Immunology and Allergy, ICPMR Westmead Hospital, Westmead 2145 Sydney, NSW Australia

(*author for correspondence: Tel/Fax: 61 2 9845 6306; E-mail: chk@allergyimmunol.com.au)

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Abstract

The year 2000 Olympic and Paralympic Games held in Sydney, Australia were unique in the history of the Games because they were staged in the early to mid spring. This led to the concern that pollen-sensitive athletes may have significant problems with allergic symptoms triggered by pollen exposure and that this may have compromised their ability to attain their best performance. Unfortunately, there was no systematic pollen count data available for the city of Sydney up until this time so the purpose of this study was to obtain a profile of the pattern and type of pollens in the region so that Olympic team managers and medical staff could be adequately advised and able to prepare allergic athletes for any exposures encountered while training and competing.

We performed pollen monitoring of three major Olympic venues over the six years before the Games to provide a profile of the most prevalent species appearing over the spring. The pollen counts obtained at the major sites were extremely high over the periods of training and competition. Tree pollens appeared from late July, peaking in August and September, whilst grass pollens appeared from September and peaked in mid October. A relatively small number of pollen varieties comprise the majority of the pollen count.

Abbreviations: CuM – Cubic metre; mm – Millimetre

1. Introduction

The year 2000 Olympic Games were held in Sydney, Australia from the 15–29 September and the Paralympic Games from 18–29 October. Unfortunately for pollen sensitive individuals, this coincided with the peak of the pollen season in Sydney. This problem was unique to the Sydney Games as no Olympics in the last century have been held in early to mid spring. Pollen monitoring of major Olympic venues revealed extremely high pollen counts during the period of Olympic and Paralympic training and competition.

The population of Sydney increased dramatically during the Games period with the arrival of athletes, team staff, spectators and media to the city. Pollen sensitive athletes were advised that they may

encounter problems with allergic symptoms such as asthma and allergic rhinoconjunctivitis triggered by pollen exposure possibly compromising their ability to attain peak performance after years of training and competition. In addition, many visitors to the venues were also at risk of developing symptoms and compromising their enjoyment of this event.

Pollen monitoring of two Olympic sites at Homebush and Blacktown commenced in 1994, with the addition of a third site at Penrith in 1998. Homebush was the major Olympic venue and the site for the opening and closing ceremonies and many outdoor events; Blacktown in the western suburbs of Sydney, was the venue for softball, equestrian events and cycling. Penrith on the banks of the Nepean River hosted rowing, kayaking and canoeing. The aim of this

study was to provide a pollen survey at major Olympic venues in Sydney for the 6 years leading up to the Games.

2. Materials and methods

Burkard (Ricksmanworth, UK) 7 day volumetric spore traps were installed at each site on a flat, unobstructed rooftop approximately 4 stories high. The traps operated from July to December and were run according to standard procedure. Briefly, tape attached to the drum was coated with Sylgard (Dow Corning Corporation, USA). At the end of a week's operation, the tape was cut into seven segments, mounted and stained using Calberla's solution. Pollen grains were counted at a magnification of x 400.

A total daily pollen count, expressed as grains per Cubic meter (CuM); was performed as well as a differential count for the following species – *poaceae* (grasses), *cupressaceae* (cypress), *platanus* (plane or sycamore), and *Plantago lanceolata* (plantain).

Pollen count results have been graphed as total weekly count (grains/CuM). Rainfall data was obtained from the The Bureau of Meteorology (Sydney).

3. Results

Figures 1–3 demonstrate the pollen counts at the three sites. At the Homebush and Blacktown sites, data is available for the six years leading up to the Games in 2000, while at Penrith, data is shown for the two years preceding the Games. The year 2000 count for all three sites is shown. The periods coinciding with both Olympic and Paralympic competition are highlighted on the graphs.

A relatively small number of pollen varieties comprised the majority of the pollen count. Figure 4 shows the differential pollen count for the Homebush site in 1999. The most prevalent pollen species found at the Homebush site were *cupressus* sp., *platanus* sp., *casuarina* sp., *poaceae* sp., *pinus* sp., *plantago* sp., and *acacia* sp.

The average monthly rainfall at the Homebush site for each year is compared to the historical monthly average in Table 1.

Table 1. Homebush site monthly rainfall (mm) vs historical average rainfall (mm)

Year	May	Jun	Jul	Aug	Sep	Oct
Historical Average	74	76	60	53	50	58
1994	24	53	15	6	9	26
1995	147	59	3	1	232	37
1996	157	63	75	137	73	11
1997	55	43	65	1	72	41
1998	177	56	70	298	33	47
1999	36	45	144	65	52	129
2000	55	41	28	18	35	64

4. Discussion

The Sydney Olympic Games were unique in Games history for being held in the early spring. Traditionally, the Games are held in August to September in the Northern Hemisphere when it is late summer – early autumn. The last Olympic Games staged in the Southern hemisphere were the 1956 Melbourne Games in Australia which were held in November, late in the pollen season. Pollen counts for this event were not recorded.

There was enormous variability in the pollen counts over the last 7 years. The early years, 1994 and 1995, were drought affected seasons in Sydney with rainfall well below the historical average (Table 1). Even so, peaks in pollen levels were clearly identifiable around the time of Olympic and Paralympic competition. The last 5 seasons had more rainfall with a corresponding surge in pollen levels. This highlights the importance of obtaining a profile over a number of years. Pollen numbers in 1999 were lower than 1998 due to the higher than average number of rainy days during the spring months (Table 1).

Factors such as changing topography may also have an influence on the pollen counts. Over the six years prior to the Games, the venue at Homebush in particular, experienced many changes in the environment as new facilities were built and comprehensive plantings were undertaken. The levels of some pollen species increased in numbers with each passing year. For instance, *platanus* pollen increased as the stands of trees matured.

Several studies have demonstrated a poorer quality of life in individuals suffering from seasonal allergic conjunctivitis when compared to non-allergic subjects (Juniper et al. 1994; Bousquet et al. 1994). We have

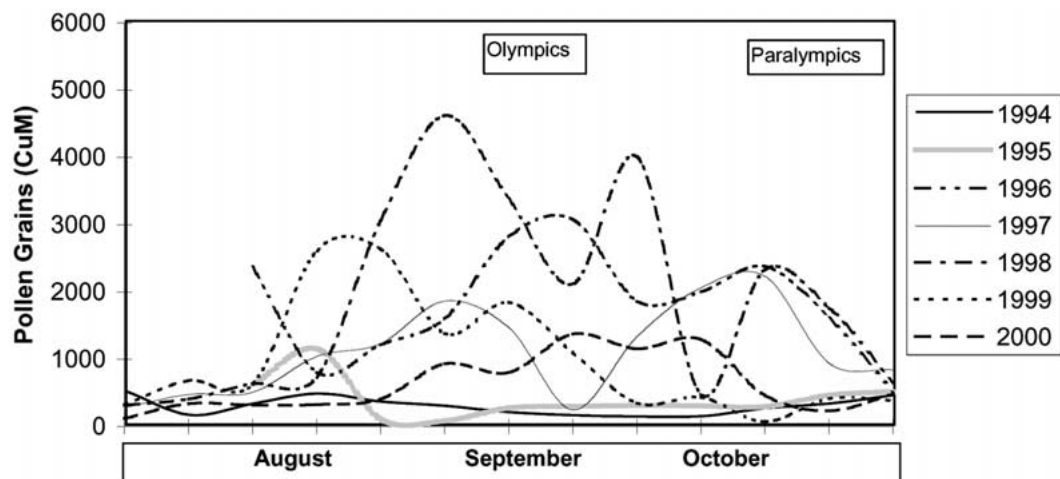


Figure 1. Homebush total weekly pollen count 1994–2000.

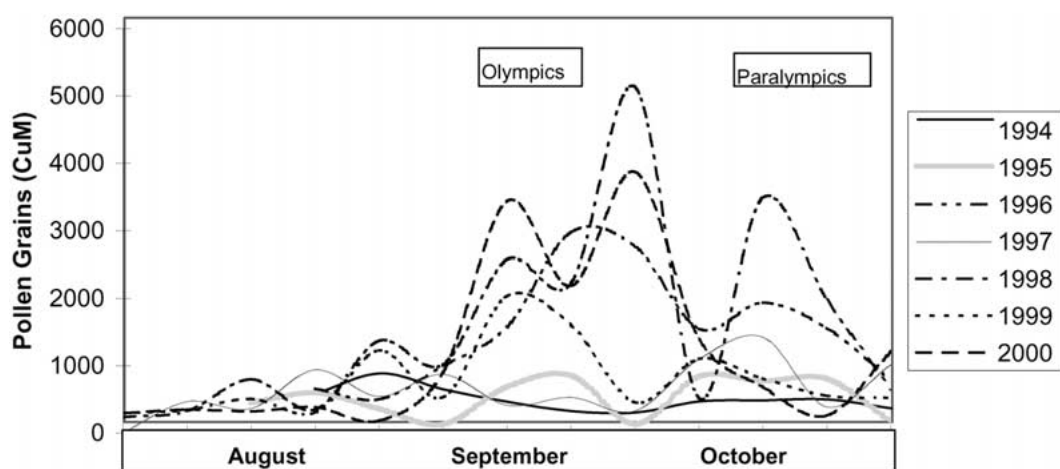


Figure 2. Blacktown total weekly pollen count 1994–2000.

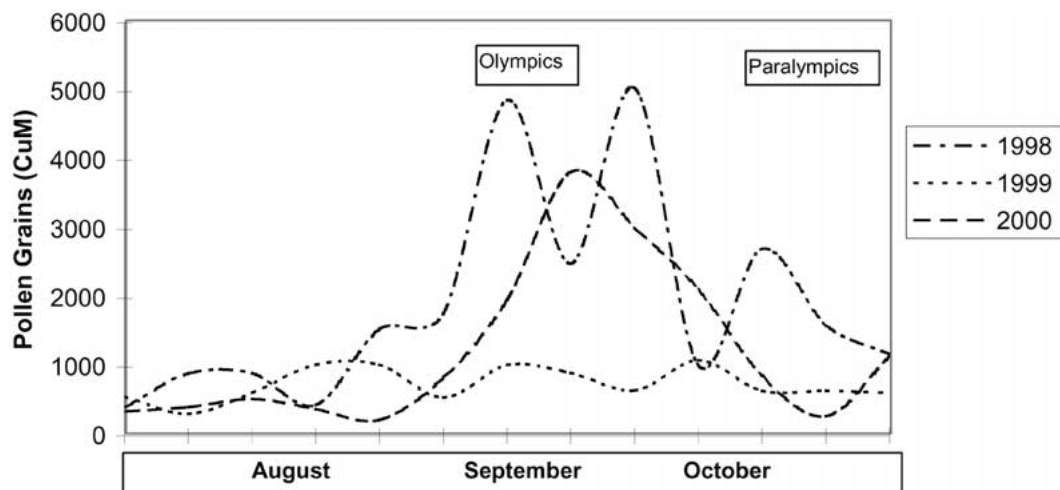


Figure 3. Penrith total weekly pollen count 1998–2000.

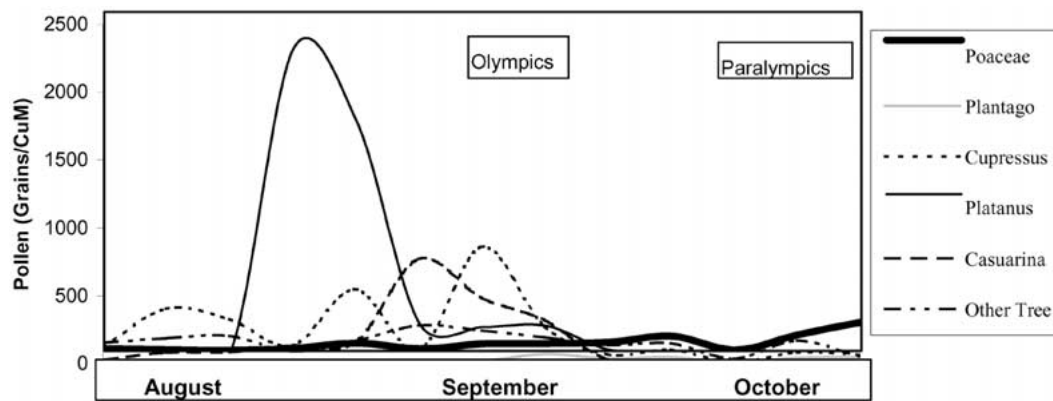


Figure 4. Differential pollen count Homebush 1999.

shown significant differences in quality of life during the spring between allergic and non-allergic athletes (Carrozzi et al. 2000), highlighting the importance of having allergic athletes well-managed during the spring.

The predominant pollens in the Australian spring are from introduced species such as *platanus*, *cupressaceae* and *poaceae*, so problems were not confined to the Australian population. Many athletes from the Northern Hemisphere are sensitised to these pollens in their country of origin and would have benefited from knowledge regarding both the type of pollen and the possible timing of peaks in counts. Premedication with permitted, preventative treatment may have been very helpful in ameliorating symptoms provoked by pollen exposure.

5. Conclusion

In view of the results of this study, Olympic team managers and medical officers were advised of the need to adequately prepare Olympic and Paralympic athletes for the possibility of exposure to high pollen levels leading up to this most important sporting event. Symptoms of pollen sensitivity such as rhinoconjunctivitis and exacerbation of asthma would have been devastating to athletes expecting peak performance. Potential Australian Olympic athletes were screened for the possibility of pollen allergy and had

medical programs tailored to meet their needs. This involved preventative therapy with permitted medication, symptomatic therapy with the newer non sedating antihistamines or immunotherapy programs if symptoms were particularly severe.

Acknowledgments

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