Trends in the Incidence of Polymyalgia Rheumatica over a 30 Year Period in Olmsted County, Minnesota, USA

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ABSTRACT. ***Objective.*** To determine time trends in the incidence and survival of polymyalgia rheumatica (PMR) over a 30 year period in Olmsted County, Minnesota, USA.

Methods. Using the unified medical record linkage system of the Rochester Epidemiology Project, we identified all incident cases of PMR among residents of Olmsted County, MN, between January 1, 1970, and December 31, 1999. Incidence rates were estimated and age- and sex-adjusted to the 1990 US white population. The annual incidence rates were graphically illustrated using a 3 year centered moving average. A Poisson regression model was used to evaluate predictors of PMR incidence. Survival rates were computed and compared with the expected rates in the population.

Results. There were 378 incident cases of PMR during the 30 year study period. Of these 66.6% were female and the mean age at incidence was 72.8 years. The overall age and sex adjusted annual incidence of PMR per 100,000 population aged ≥ 50 years was 58.7 (95% CI 52.8, 64.7). Incidence rates increased with age in both sexes, but in women, unlike in men, incidence fell after age 80. The incidence rates varied over the period of observation, but no significant trends over time were found. In the multivariable analysis, sex ($p = 0.023$), age ($p < 0.001$), and age^2 ($p < 0.001$), but not calendar year ($p = 0.24$) were significant predictors of incidence. Survival among individuals with PMR was not significantly different from that expected in the population ($p = 0.06$).

Conclusion. The incidence of PMR has remained relatively stable over the past 30 years. (J Rheumatol 2002;29:1694–7)

Key Indexing Terms:
POLYMYALGIA RHEUMATICA INCIDENCE EPIDEMIOLOGY

Polymyalgia rheumatica (PMR) is a clinical syndrome of unknown etiology, which commonly occurs in individuals aged > 50 years. The incidence of this condition increases with age, appears to vary in different parts of the world, and may have seasonal trends. The incidence, prevalence, and survival of PMR in Olmsted County, Minnesota, USA, from 1970 to 1991 were reported[1]. Our study extends previous epidemiologic observations a further 8 years, resulting in a 30 year population based history of PMR. It also extends our ability to evaluate time trends in the incidence of PMR and to generate hypotheses regarding the pathogenesis of the disease.

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MATERIALS AND METHODS

The population of Olmsted County, Minnesota, is well suited for investigation of the epidemiology of PMR because comprehensive unit medical records for all residents seeking medical care are available. A record linkage system allows ready access to the medical records from all health care providers for the local population, including the Mayo Clinic and its affiliated hospitals, the Olmsted Medical Group and Olmsted Community Hospital, local nursing homes, and the few private practitioners. The potential of this data system for population based studies has been described[2]. This system assures virtually complete ascertainment of all clinically recognized cases of PMR among Olmsted County residents.

Using this data resource, an inception cohort of all cases of PMR first diagnosed between January 1, 1970, and December 31, 1991, among Olmsted County residents was identified as described[1]. We used the same method of case ascertainment to expand this cohort to include all incident cases of PMR among residents between January 1, 1992, and December 31, 1999. A trained nurse abstractor screened the medical records of individuals who had received 1 or more diagnoses of PMR, giant cell arteritis (GCA), or temporal arteritis (TA). Individuals were included as PMR cases if they fulfilled the following 3 criteria: (1) age 50 years or older; (2) bilateral aching and morning stiffness (lasting ≥ 30 min) persisting for at least 1 month and involving 2 of the following areas: neck or torso, shoulders or proximal regions of the arms, and hips or proximal aspects of the thighs; and (3) erythrocyte sedimentation rate elevated to > 40 mm/h (Westergren). However, individuals aged 50 years or older were also included if they fulfilled only the first 2 criteria and also had documentation of a prompt response to corticosteroid therapy. The presence of other diseases that could explain the symptoms, such as active rheumatoid arthritis, systemic lupus erythematosus, polymyositis, chronic infection, or multiple

myeloma, were considered exclusion criteria. In cases where the diagnosis was questionable, 3 rheumatologists (MFD, GGH, and SEG) reviewed all the medical information and reached consensus on the diagnosis. Patients were followed up until death or January 1, 2000.

New incidence cases were added to those already identified from the previous incidence cohort. Age- and sex-specific incidence rates were then calculated using the number of incidence cases as the numerator and population estimates based on decennial census counts as the denominator, with linear interpolation to estimate population size for intercensal years. Annual incidence rates were illustrated using a 3 year centered moving average. Overall rates were age and sex adjusted to the 1990 United States white population. Ninety-five percent confidence intervals (CI) were computed for incidence rates, assuming that the observed number of cases follows a Poisson distribution.

Generalized linear models (GLM) with the log-link function (Poisson regression models) were used to evaluate the relationship between incidence, age, sex, and chronologic time. In such analyses, the logarithm of PMR incidence rate is expressed as a function of age, sex, and chronologic time. The observations used for this analysis were the age-sex-calendar, time-specific incidence rates using age groups (50–54, 55–59, 60–64, 65–69, 70–74, 75–79, 80+), and calendar time periods (1970–74, 1975–79, 1980–84, 1985–89, 1990–94, 1995–99). The midpoints of the age groups and the calendar time periods were used in the analysis. Two-way interactions and higher order polynomial terms for age and time were also examined. The SAS statistical package was used to fit the models.

Survival following the diagnosis of PMR was estimated using the Kaplan-Meier product-limit method. Observed and expected survival were compared using the log-rank test, where expected survival was based on the sex and age of the study population and on death rates from the Minnesota Caucasian life tables. The standardized mortality ratio (SMR), the ratio of observed number of deaths to the expected number, was estimated and a 95% CI obtained assuming that the observed number of deaths follows a Poisson distribution.

RESULTS

The pre-existing PMR incidence cohort (1970–91) comprised 245 individuals. In order to extend the cohort, we identified from the medical indices a further 435 individuals with one or more potential diagnoses consistent with PMR, GCA, or TA. Twenty-five (5.7%) of these medical records were not available for screening due to refusal of research authorization and 4 (0.9%) were excluded due to missing information. The remaining 406 records were screened. One hundred eighty-seven patients were excluded because they did not meet criteria for PMR and a further 86 were not resident in Olmsted County at PMR incidence date. Thus, there were 133 Olmsted County residents age ≥ 50 years who first fulfilled the diagnostic criteria for PMR between 1991 and 2000, amounting to a total of 378 incident cases of PMR between 1970 and 2000. The age and sex adjusted annual incidence rate of PMR was 58.7 (95% CI 52.8, 64.7) per 100,000 population aged 50 years and older. Two hundred fifty-two (66.7%) of these individuals were female, 126 (33.3%) were male, and the mean age at incidence of PMR was 72.8 years. The mean age at incidence did not change significantly over time ($p = 0.25$). Mean length of followup was 8.7 years [standard deviation (SD) 6.1, range 0.04–27.43].

The total annual incidence rates increased with advancing age to a maximum in the 70–79 age group, after which the incidence rate fell (Table 1). The incidence rate in men, however, in contrast to that in women, continued to rise after age 79. Although the overall incidence rate in women was double that in men, the age-specific rates were marginally higher in men in the 50–59 and 80+ age groups.

In Figure 1, the 3 year moving average annual incidence rates per 100,000 population are plotted to illustrate trends over the entire study period. Although there is considerable variability in incidence over time, no distinct overall or continuing trend is apparent.

Sex ($p = 0.023$), age ($p < 0.001$), and age^2 ($p < 0.001$) were all significant predictors of incidence rates in the Poisson regression analysis examining the incidence of PMR. Calendar year was not a significant predictor of PMR incidence over the 30 year period ($p = 0.24$). The interaction between sex and age was also not significant, once age, age^2, and sex were included in the model.

Survival in patients with PMR was only marginally different from that expected in the general population of the same age and sex, as manifested by a log-rank p value of 0.064 and a SMR of 0.88 (95% CI 0.75–1.01) (Figure 2).

DISCUSSION

Our study supports previous findings that PMR is a common rheumatic disease of middle aged and older persons in the Olmsted County population. The average incidence rate of PMR over the 30 year period (58.7/100,000) is only slightly higher than our earlier result of 52.2/100,000 persons 50 and older. The 30 years included in this study is, to our knowledge, the longest period a population has been assessed for PMR. Using the same case ascertainment procedures for PMR from 1970 to 1999, we found that the incidence of PMR has remained relatively stable over this 30 year period. This finding is in contrast to population studies of the incidence of rheumatoid arthritis, which consistently reveal decreasing incidence rates in several different populations[3-9]. Our findings of substantial variation in annual incidence are consistent with those of Petursdottir, *et al*[10]. However, these investigators reported an increase in biopsy positive GCA during the years 1976–95. The latter findings may be a reflection of increased awareness of GCA among clinicians, leading to increased biopsy rates.

We demonstrated that PMR is common among people aged ≥ 50 years among Olmsted County residents. The reported incidence rates from different populations are quite variable, with a clear tendency for higher rates from studies performed in Northern European populations. Gran, *et al* reported a rate of 112.6 per 100,000 population > 50 years old in Norway[11]; Boesen, *et al* reported a rate of 76.6/100,000 in Denmark[12]; Schaufelberger reported a rate of 49.7/100,000 in Goteborg, Sweden[13]; and Franzen reported a rate of 69.8/100,000 in Finland[14]. Studies from Southern Europe have found much lower incidence rates, including rates of 12.7/100,000 in Northern Italy[15] and

Table 1. Annual incidence of PMR among residents of Olmsted County, Minnesota, 1970–99, by sex and age group, per 100,000 population.

	Men		Women		Total	
	No. of Cases	Rate (95% CI)	No. of Cases	Rate (95% CI)	No. of Cases	Rate (95% CI)
Age group, yrs						
50–59	15	11.8 (5.8, 17.7)	13	9.92 (4.5, 15.3)	28	10.8 (6.8, 14.8)
60–69	34	41.4 (27.5, 55.3)	55	56.8 (41.8, 71.8)	89	49.7 (39.4, 60.0)
70–79	51	103.6 (75.1, 132.0)	124	160.7 (132.4, 188.9)	175	137.1 (116.7, 157.4)
80+	26	117.1 (72.1, 162.1)	60	107.0 (79.9, 134.1)	86	110.2 (86.9, 133.6)
Total ≥ 50	126	54.3 (44.67, 63.9)	252	70.5 (61.7, 79.3)	378	63.5 (57.1, 70.0)
Age adjusted		44.8 (37.0, 52.6)		69.8 (61.2, 78.4)		58.7 (52.8, 64.7)

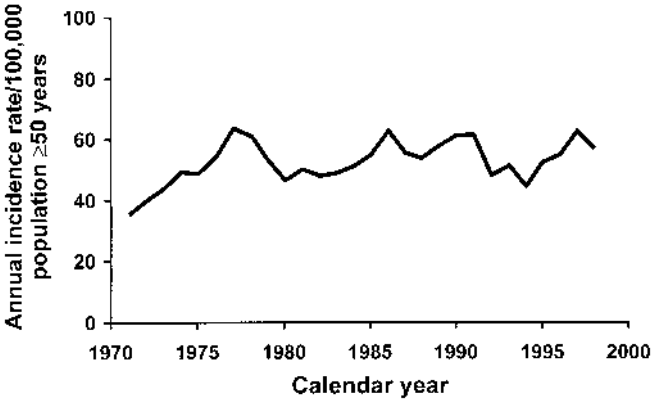

Figure 1. Annual incidence of PMR in Olmsted County, Minnesota, 1970–1999.

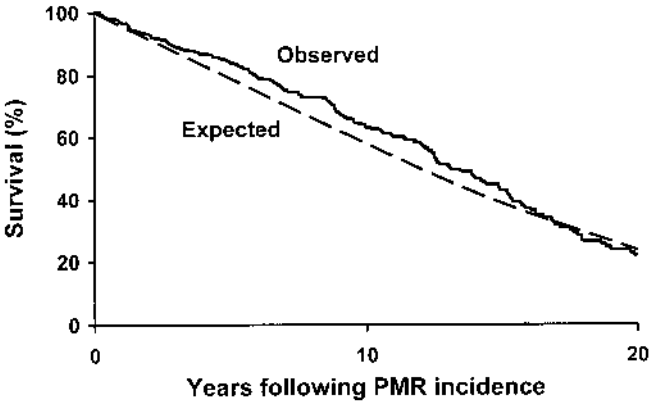

Figure 2. Survival curve for patients with PMR (n = 378) compared with expected survival.

18.67/100,000 in Northwestern Spain[16]. Our results were closer to those of the Northern European studies, which probably relates to the fact that the population of Minnesota is composed primarily of people of Northern European descent.

We found a decline in incidence in the 80+ age group in women but not in men. Such a decline in incidence in the oldest age groups has been noted in other studies, and may relate to reduced suspicion of disease in oldest patients, perhaps resulting in underdiagnosis.

The mortality rates among both men and women with PMR in this study were similar to those in the general population, a finding that concurs with several other studies[12,17,18].

As a result of the introduction of a privacy law in Minnesota in 1997, 25 histories from among 435 potential subjects were not available for screening, as these individuals refused to authorize use of their medical records for research. While this is a potential limitation of our study, it is unlikely to have significantly affected the incidence rate, as the number of PMR cases resulting from screening these extra histories would not have been expected to exceed 8 in total. Also, as some racial and ethnic groups are underrepresented in Rochester, Minnesota, where the population in 1990 was 96% white according to the US census data, the results of our population based study are only generalizable to the US white population.

We found that PMR incidence rates have remained stable over the past 30 years, despite considerable variability from year to year, and that survival in patients with PMR is similar to that in the population.

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