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Prevalence of Raynaud's phenomenon in the adult New Zealand population

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Abstract

Aims To estimate the prevalence of Raynaud's phenomenon (RP) in the New Zealand adult population.

Methods 350 adults 18 years and over, random selected from the electoral roll, were sent a postal survey based on the UK Scleroderma Study Group questionnaire. Participants were classified as having RP if they had biphasic colour changes.

Results There was a 67% response rate. The prevalence of RP was estimated to be 18.8% (95% Confidence Interval (CI) 13.0%–27.1%) in females and 4.9% (95%CI 1.9%–13.0%) in males. The prevalence decreased with age. There was a higher prevalence in the warmer north of the country. People of Māori descent and in more manual occupations had more serve symptoms. Among those reporting symptoms 11% (95%CI 7%–17%) had consulted a doctor.

Conclusion New Zealand has high rates of RP. Few people with RP consult medical practitioners about their symptoms.

Raynaud's phenomenon (RP) has been defined as peripheral vasoconstriction in response to cold, characterised by colour changes, pain, and tautness/fullness in the digits.[1] The prevalence of RP is generally found to be less than 10% with some studies finding rates of about 20%. De Angelis et al[2] presented a summary table of studies of RP prevalence. Prevalence ranged from less than 1% to 16% in men and from 3% to 22% in women. Other studies have published prevalence estimates within these ranges.[3–6]

Differences in climate,[7] questionnaires and definitions account for some of the differences in prevalence. The UK Scleroderma Study Group[1] proposed criteria for definite RP of repetitive episodes of biphasic colour (at least two of pallor, cyanosis, erythema), in either cold or normal environments.

Occupational factors increase the risk of RP.[8] Hand transmitted vibration increases the risk of RP.[9] RP may be classified as primary (unrelated to other diseases) or secondary, most commonly in association with scleroderma. Solvent exposure increases the risk of the connective tissue disease scleroderma.[10]

A meta-analysis of follow up studies of people with primary RP (not secondary to a diagnosable disease) found, after an average follow up of four years, that a related disease was diagnosed in 13%, with 65% of these being scleroderma.[11] Higher rates and more severe RP have been observed in people exposed to solvents.[5]

There appears to be no published estimates of RP prevalence in New Zealand. With a geography that ranges from subtropical to sub-Antarctic, New Zealand provides an opportunity to explore effects of latitude. Estimates of the general population

prevalence of RP will allow comparison with exposed workers. This paper presents estimates of the prevalence of Raynaud's phenomenon in the New Zealand adult population.

Method

A random sample of 350 people from the New Zealand electoral roll were sent a postal questionnaire. People with overseas addresses were excluded. The New Zealand Electoral Roll contains 92% of the estimated midyear 2006 resident population 18 years of age and over. The survey was sent in September 2006. Non-responders were sent two reminder letters.

The sample size was chosen so that with an expected 210 responses the 95% confidence interval width for the proportion of people with RP would be within ± 7%.

Raynaud's phenomenon was assessed using the UK Scleroderma Study Group[1] questionnaire with the following questions:

(a) Are your fingers sensitive to cold?

(b) Do your fingers show unusual colour changes? If Yes, do they become white, blue, red or purple?

(c) Have your fingers become numb or had pins and needles in response to cold?

(d) If applicable have the colour changes or numbness described occurred in the absence of cold exposure—i.e. at normal temperature?

Participants were classified as having possible RP if they answered yes to only one colour in question (b) or answered yes to question (c) and definite if they answered yes to at least two colours in question (b). If in addition to two colours they answered yes to (c) and (d) then they were classified as severe.

People were also asked their gender, if they had ever consulted their general practitioner or a specialist concerning their symptoms and if so what was the diagnosis. People's age when the survey was sent was calculated from the period of birth provided by the electoral roll. People's names on the roll were used for gender response rates. Meshblocks on the roll were used for an area-based index of socio-economic deprivation NZDep2006[12] with decile 10 being the most deprived.

District Health Boards, provided by the electoral roll, were used to assign people to Regional Health Authority (RHA) regions. Occupations recorded on the roll were used to assign socioeconomic stratification (SES) using NZSEI-96.[13]

The study was approved by the Multi-region Ethics Committee.

Questionnaire data was double entered. Non-responses to yes or no questions were treated as negative responses. Prevalences were post-stratified to the estimated midyear resident 18 years and over 2006 population estimates from Statistics New Zealand. Confidence intervals for stratified estimates were calculated using log transformations.[14] Proportions were compared with chi-squared tests, chi-squared tests for trends, Spearman rank correlation and Kruskal-Wallis Test.

Results

Response rate—There were two further exclusions due to the persons being overseas. 234 completed questionnaires were returned, a 67% response rate. Eight envelopes were returned as no longer at that address.

Prevalence—The prevalence of RP (definite and severe) was 11.5% (95%CI 7.7%–16.3%) (Table 1). The prevalence of RP with post-stratification by age group and sex was 12.1% (95%CI 8.5%–17.1%).

Table 1. Prevalence of Raynaud's phenomenon (RP)

Variables	Not RP	Possible	Definite	Severe	P-value RP	P-value severity trend
Female						
18 – 24	27% (3)	45% (5)	27% (3)	0% (0)	0.082*	0.18†
25 – 44	40% (17)	35% (15)	21% (9)	5% (2)		
45 – 64	44% (22)	46% (23)	8% (4)	2% (1)		
65 and over	45% (13)	41% (12)	7% (2)	7% (2)		
Female total	41% (55)	41% (55)	14% (18)	4% (5)	0.002‡§	0.036*§
Male						
18 – 24	10% (1)	80% (8)	10% (1)	0% (0)	0.10*	0.040†
25 – 44	44% (12)	48% (13)	4% (1)	4% (1)		
45 – 64	51% (23)	47% (21)	2% (1)	0% (0)		
65 and over	53% (9)	47% (8)	0% (0)	0% (0)		
Male total	46% (46)	50% (51)	3% (3)	1% (1)		*
Māori descent	25% (6)	54% (13)	8% (2)	13% (3)	0.14‡	0.009
Māori descent	45% (19)	44% (94)	9% (19)	1% (3)		
not indicated						
NZDep2006 (decile)						
1 – 3	48% (42)	43% (38)	8% (7)	1% (1)	0.11*	0.15†
4 – 7	41% (39)	48% (46)	7% (7)	3% (3)		
8 – 10	39% (19)	43% (21)	14% (7)	4% (2)		
SES						
1 & 2	54% (13)	33% (8)	13% (3)	0% (0)	0.55*	0.025†
3 & 4	42% (25)	49% (29)	7% (4)	2% (1)		
5 & 6	24% (9)	59% (22)	16% (6)	0% (0)		
RHA						
Southern	40% (21)	51% (27)	6% (3)	4% (2)	0.011‡	0.50‖
Central	41% (25)	52% (32)	7% (4)	0% (0)		
Midland	50% (18)	47% (17)	3% (1)	0% (0)		
Northern	44% (36)	35% (29)	16% (13)	5% (4)		
Total	43% (101)	45% (106)	9% (21)	3% (6)		

* Chi-squared test for trend; † Spearman rank correlation; ‡ Chi-squared test; § Gender comparison; ‖ Kruskal-Wallis Test

The prevalence of RP (definite and severe) was significantly higher in females 17.3% (95%CI 11.3%–24.8%) than males 4.0% (95%CI 1.1%–9.8%) (p=0.002). The prevalence was significantly higher in younger people (p=0.031 chi-squared test for trend). The prevalence of RP with post-stratification by age group was 18.8% (95%CI 13.0%–27.1%) in females and 4.9% (95%CI 1.9%–13.0%) in males.

The prevalence was higher, but not statistically significantly so, in people of Māori descent 20.8% (95%CI 7.1%–42.2%) than others 10.6% (95%CI 6.7%–15.6%) (p=0.14) with a significant trend in severity (0.009). There was a non-statistically significantly trend to higher prevalence in more deprived areas (p=0.11). There was no significant trend in RP with SES (p=0.57) with a significant increase in severity with increasing SES (p=0.025). The prevalence was significantly different between the RHA areas (χ^2=11.1; df=3; p=0.011), higher in the Northern RHA area, with no significant difference in severity (p=0.50).

Fifty-two percent (95%CI 45%–58%) (121/234) reported their fingers were sensitive to cold. Forty one percent (95%CI 35%–48%) (97/234) reported colour changes, among those, white was the most common 65%, followed by red 36%, purple 24%, and blue 16%. Forty four percent (95%CI 38%–51%) (103/234) reported their fingers become numb or had pins and needles in response to cold.

Fifteen percent (95%CI 11%–21%) reported their colour changes or numbness occurred in the absence of cold exposure. Sixty nine percent (25/36) of these were classified as possible RP. There was a significantly increasing tend with SES, with those in SES 5 & 6 reporting occurrences in the absence of cold exposure 7.8 (95%CI 1.1–56.1) times more often than SES 1 & 2. Symptoms in the absence of cold exposure were reported 2.1 (95%CI 1.0–4.3) times more often by people of Māori descent.

Of those reporting any symptom 11% (95%CI 7%–17%) (17/153) had consulted their general practitioner or a specialist concerning their symptoms. Among those reporting any symptom, there was no significant difference (p=0.50) in the consultation rate of those with RP (definite and severe), 7.4% (2/27), and those without, 11.9% (15/126). The consultation rates were 1.4 (95%CI 0.5–3.7) times higher in people who reported colour changes, 3.6 (95%CI 0.9–15.3) times higher for those whose fingers become numb or had pins and needles in response to cold and 2.3 (95%CI 0.9–5.5) times higher for those with colour changes or numbness occurring in the absence of cold exposure.

Females had a significantly higher consultation rate (15%) than males (5%) (p=0.047). There was a significantly increasing trend in consultation rates with age (p=0.046). Diagnoses reported were nerve damage (four), arthritis (one), rheumatoid arthritis (one), osteoarthritis (one), chill blains (two), poor circulation (three), lack of oxygen (one). Two reported that no diagnosis was made, one was not sure of the diagnosis and one was being investigated. The two people responding to the diagnosis question who were classified as having RP reported lack of oxygen (definite RP) and not sure (severe RP).

Rates for alternative definitions of RP used in other surveys are shown in Table 2.

Table 2. Alternative definitions of Raynaud's phenomenon (RP)

RP definition	Female N=133 % (95%CI) (n)	Male N=101 % (95%CI) (n)	Total N=234 % (95%CI) (n)
Sensitive*, white† occurring at normal temperatures	5% (2–11) (7)	4% (1–10) (4)	5% (2–8) (11)
Sensitive*, at least a biphasic† and numb‡	11% (6–18) (15)	2% (0–7) (2)	7% (4– 11) (17)
Sensitive*, white† and numb‡	21% (14–29) (28)	11% (6–19) (11)	17% (12– 22) (39)
Sensitive*, white†	25% (18–33) (33)	21% (13–30) (21)	23% (18– 29) (54)
Sensitive*, white or blue†	29% (22–38) (39)	22% (14– 31) (22)	26% (21– 32) (61)
Sensitive*	58% (49– 66) (77)	44% (34– 54) (44)	52% (45– 58) (121)

* Sensitive to cold; † colour change; ‡ Numb or had pins and needles in response to cold

Discussion

Adult women had a higher prevalence of RP than men. The prevalence decreased with age. High rates of symptoms were reported by people of Māori descent and SES 5 & 6 (more manual occupations), particularly possible RP or colour changes or numbness occurring in the absence of cold exposure.

Response bias could account for some of the differences found with many of the groups with higher prevalence having lower response rates.

The UK Scleroderma Study Group classification criteria[1] was chosen as a brief questionnaire that would allow international comparisons. Their classification criteria that relied on answers to most questions failed to classify 13% of responses, which were classifiable with modified criteria. The criteria, which require at least two colour changes for definite RP, may be failing to identify vibrating white finger syndrome as RP. Higher rates of possible RP were found in groups likely to have higher rates of exposure to vibration in their occupations. Failure of the classification system to classify RP from vibration damage is supported by three of the four people reporting diagnoses of nerve damage being classified as possible RP (all with white colour change and numbness or pins and needles in response to cold).

The UK Scleroderma Study Group found that their questionnaire criteria classified as possible RP 29% of those classified as definite and severe RP by majority clinician assessment.[1] In that study all those classified as RP (definite or severe) by the questionnaire criteria were classified as either definite or severe by majority clinician assessment, suggesting that the prevalence of RP is being underestimated by this study.

The prevalence in New Zealand, 12%, is in the upper range of those found in other countries. Other surveys using similar questions and the same definition have found a lower prevalence of RP. The prevalence found in Massachusetts[4] was 8%, in a Greece population[15] 5% and in a Turkey population[6] 6%. Other surveys with different definitions of RP have similar rates for comparable questions in Demark,[16] Great Britain[17,18] and Estonia.[19] Lower rates were found in South Carolina,[20-22] Sweden,[23] Massachusetts,[24] Netherlands,[25] Spain,[26,27] Great Britain[9] and Italy.[2] This study was within the range of rates found in France.[7] A relationship between RP and climate was found in France.[7]

The cooler climate in New Zealand may have influenced higher prevalence found. No trend with climate in New Zealand was found in this study. The higher prevalence in the Northern RHA may result from migration of people with RP to warmer areas. A five region prevalence study[7] found that the majority of people with RP in the warmest regions had previously lived in a colder climate.

This study found a higher prevalence of RP for women than men, as has been found in most[2,4-7,9,15,17,18,22,24,25,28] but not all[3,7,19,20,26,27,29,30] other studies.

Although there was a trend of decreasing RP with increasing age this is not consistent with some other studies reporting increasing trends.[4,19] The decreasing prevalence with age in this study is consistent with serial examinations of the Framingham Heart Study offspring cohort.[31] People were assessed at baseline and approximately seven years later, there was a significant decrease in prevalence from 9.4% to 5.2%.

Variation in occupational vibration exposures may account for some of the differences between studies. In a survey in Japan[29] 49% of males with RP were exposed to vibration, with vibration contributing to the increase prevalence with age for men and the small gender difference. In the Framingham study[31] 27% of males with RP were exposed to vibration.

There was no significant relationship between RP classification and whether a person had consulted a doctor about their symptoms. Experiencing fingers becoming numb or having pins and needles in response to cold or having colour changes or numbness occurring in the absence of cold exposure may influence medical consultation. Females were more like to consult, possibly partly reflecting high consultation rates for female generally.[32] Older people may have had symptoms for a longer during which might have influenced the increasing consultation rates with age. Low consultation rates for RP have also been found in other studies.[6,9,15,17,18,27]

In this study 15% (95%CI 11%–21%) reported colour changes or numbness that occurred in the absence of cold exposure, with 3% (95%CI 1%–5%) of people classified as severe. Few other studies have reported similarly classifications. A study in Sweden[23] found 20% of women reported cold and white fingers and for 21% of a sample of these it occurred in summer, giving a prevalence of 4% close to a similar estimate in this study (table 2). A study in Greece,[15] with a lower prevalence of RP, found 27% (7/26) of participants with RP reported colour changes in emotional stress, similar to the proportion in this study with RP reporting symptoms at normal temperature, 22% (6/27).

New Zealand has high rates of RP. There are disparities, with females, Māori and those in more manual SES having higher rates of symptoms. Occupational exposures are likely to contribute to the later differences.

Competing interests: None known.

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