In the palm of your hand
Lanting, Rosanne

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Prevalence of Dupuytren Disease in The Netherlands

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Chapter 2

Background
Dupuytren Disease (DD) is a fibroproliferative disease of palmar fascias of the hand. The prevalence of DD and the association with potential risk factors have been the subject of several studies, although there is a paucity of such data from The Netherlands.

Methods
To study the prevalence of DD, the authors drew a random sample of 1360 individuals, stratified by age, from the northern part of The Netherlands. Of this sample, 763 individuals aged 50 to 89 years participated in this cross-sectional study. The authors examined both hands for signs of DD, and a questionnaire was conducted to identify potential risk factors. The effects of these risk factors were investigated using logistic regression analysis. Additional analyses were performed to develop a logistic prediction model for the prevalence of DD.

Results
The prevalence of DD was 22.1%. Nodules and cords were seen in 17.9%, and flexion contractures were present in 4.2% of the study population. Prevalence increased with age, from 4.9% in participants aged 50-55 years to 52.6% among those aged 76-80 years. Males were more often affected than females; 26.4% versus 18.6% respectively (P = 0.007). Other significant risk factors were previous hand injury, excessive alcohol consumption, familial occurrence of DD, and presence of Ledderhose disease.

Conclusions
The results show a high prevalence of DD in The Netherlands, particularly the nodular form. Using the developed logistic prediction model the prevalence of DD can be estimated, based on the presence of significant risk factors.
Introduction

Dupuytren Disease (DD) is a benign fibroproliferative disease of some of the palmar fascias of the hand. This disease causes the formation of nodules which can eventually progress into cords, giving rise to flexion contractures of the affected fingers. Etiologic risk factors previously described include smoking, alcohol consumption, manual work, hand trauma, diabetes mellitus, and epilepsy. However, the role of these factors is not fully elucidated, and evidence is at times contradictory. Observations from twin studies and family studies suggest that DD has a strong genetic component. Recently, in a genome-wide association study, nine genes were identified to be associated with DD.

The disease is particularly common in northern parts of Europe and in countries where people of Northern European descent live. The majority of prevalence studies has been conducted in Scandinavia and in the United Kingdom. Sporadic cases have been identified in other parts of the world, such as Africa and the Far East. The prevalence of DD has been found to vary from 0.2 to 56%, indicating great heterogeneity between study populations.

Prevalence rates of Northern European countries such as The Netherlands and Germany are unknown. Since life expectancy is expected to increase considerably in the coming decades and DD is a chronic disease of the elderly, it is becoming more important to improve our knowledge about current prevalence rates. Prevalence rates may be used to evaluate cost effectiveness of emerging treatments, such as percutaneous needle fasciotomy, collagenase injection, and radiotherapy.

The primary aim of this study was to determine the prevalence of DD in the general population older than 50 years in the northern part of The Netherlands. A secondary goal was to investigate the association between DD and potential risk factors.

Methods

A cross-sectional study was performed using a stratified random sample by age of 1360 inhabitants older than 50 years in Groningen, The Netherlands. The ratio of the sample size and population size in each age category was the same across age categories. The sample was drawn from the municipal administration, and our results were compared with data from the central bureau of statistics, Statistics Netherlands. To conduct this study, dispensation was obtained from our institutional ethics review board. If subjects were willing to participate and signed an informed consent form, we examined both hands for signs of DD and knuckle pads. Signs of DD include tethering of the skin, nodules, cords, and finger contractures in individuals with cords. If any of these features was present, the individual was labeled as having DD. We used the classification of Iselin to assess the severity of the disease. This classification consists of four categories (Figure 1):

- Degree I: palmar nodules and small cords without signs of contracture
- Degree II: contracture of the metacarpophalangeal (MCP) joint
- Degree III: contracture of the MCP and proximal interphalangeal (PIP) joint
- Degree IV: severe contracture of the MCP and the PIP joints with hyperextension

Figure 1. Iselin classification of severity of DD. (a) degree I in ring finger (b) degree II in ring finger (c) degree III in little finger (d) degree IV in little finger.
Prevalence of Dupuytren Disease in The Netherlands

The prevalence of Dupuytren disease (DD) was calculated if any of the three effects (fingers, hands, and interaction) would be significant at the level of $\alpha = 0.05$. In addition, the effects of possible risk factors on the prevalence of DD were investigated with logistic regression analysis. The effects of gender, diabetes, epilepsy, family history of DD, and presence of Ledderhose disease were corrected for age categories. The effects of manual labor, hand injury, alcohol consumption, smoking, and the presence of knuckle pads were corrected for gender and age categories in this analysis.

The final analyses were conducted to determine a logistic prediction model for the prevalence of DD. The risk factors with a $p$-value less than 0.15 from previous analysis were selected for the model, and age was taken continuous and a quadratic relation was assumed. Backward elimination using the Wald test statistic was applied at the significance level of 0.05 to develop the final model.

Results
Prevalence of Dupuytren Disease

Our stratified random sample by age included 1360 individuals. In total 763 were willing to participate; 348 males and 415 females. Population characteristics are listed in Table 1. There were no differences between the participants and nonresponders regarding gender, analyzed with Pearson’s Chi-square test ($P = 0.635$). Age of participants ranged from 50 to 89 years, with a median age of 62 years (IQR 56 – 69). The nonresponse group had a median age of 64 years (IQR 57 – 77) and was statistically significantly older than the group of participants (Mann-Whitney U test: $P < 0.001$). Furthermore, nonresponse was not equally distributed over age categories (Pearson’s Chi-square test: $P < 0.001$); in age categories younger than 70 years, more individuals were willing to participate than in the older categories.

Comparison of percentages regarding smoking habits, alcohol consumption, and the presence of diabetes mellitus between our study population and the general population of The Netherlands showed that there were no explicit differences between these populations (Table 2).

In total, 169 participants were affected with DD, a prevalence of 22.1% (95% CI 19.2 – 25.0). DD was more common in males than in females and prevalence increased with age (Table 3). The majority ($n = 137$) of the affected participants had palmar nodules without finger contractures (Iselin I). In 32 participants a contracture of one or more digits was present, a prevalence of 17.9% for nodules and 4.2% of the distal interphalangeal (DIP) joint, also known as a Boutonnière deformity.

In addition to examination of the hands, we inquired about smoking habits, alcohol consumption, dexterity, whether participants had performed manual labor during a significant part of their life, and whether they had sustained hand injury in the past, including surgery. Additionally, we inquired about the presence of diabetes or epilepsy; familial occurrence of DD, defined as a relative of first degree with DD; and for presence of Ledderhose disease.

Sample size calculation

Sample size calculation was performed using a formula described by Daniel. The following unknowns were imputed in the formula: $P = 0.15$ based on an expected prevalence of 15% as found in a previous pilot study (unpublished data), $\delta = 0.025$ to define the length of the confidence interval, and a two-sided $\alpha$ of 0.05. Taking into account an estimated non-response rate of 40%, a sample size of 1360 individuals was calculated. Age stratification in eight categories was based on age distribution of the general population in Groningen, derived from the statistical yearbook 2010 of the Groningen City Council. Based on the calculated sample size and the age distribution, a simulation study was conducted to investigate if the stratified sampling approach could estimate a logistic model for the prevalence of DD in age as precisely as would a random sample (results not provided).

Statistical analyses

The characteristics of the collected sample were described by medians with interquartile range (IQR) and by proportions with appropriate confidence intervals. The median age and proportion of males between the sample and nonresponders was tested using the Mann-Whitney U test and Pearson’s Chi-square test, respectively. The proportion of nonresponders across age categories was tested using the Chi-square test again. The overall prevalence was calculated and categorized by disease severity. The difference in prevalence for the hands and fingers was tested with generalized estimating equations (GEE) using the cumulative logit link function, an exchangeable working correlation matrix, the robust estimator and the generalized score statistic. First, the interaction effect between hands and fingers was tested, and if not significant, the hand and finger effects were investigated separately. These effects were corrected for age categories. Odds ratios for the pairwise differences between hands and fingers were calculated if any of the three effects (fingers, hands, and interaction) would be significant at the level of $\alpha = 0.05$.

In addition, the effects of possible risk factors on the prevalence of DD were investigated with logistic regression analysis. The effects of gender, diabetes, epilepsy, family history of DD, and presence of Ledderhose disease were corrected for age categories. The effects of manual labor, hand injury, alcohol consumption, smoking, and the presence of knuckle pads were corrected for gender and age categories in this analysis.

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The final analyses were conducted to determine a logistic prediction model for the prevalence of DD. The risk factors with a $p$-value less than 0.15 from previous analysis were selected for the model, and age was taken continuous and a quadratic relation was assumed. Backward elimination using the Wald test statistic was applied at the significance level of 0.05 to develop the final model.
for contractures in our population. Primary DD was confirmed in 162 patients, and recurrent disease was much rarer; this condition was seen in only seven patients. A total of 91 patients (53.8%) had bilateral disease. In primary disease, 119 left hands (15.6%) and 131 right hands (17.2%) were affected. Recurrent disease was noted in five left hands (0.7%) and five right hands (0.7%). In total, 456 rays were affected, resulting in an average of 2.7 affected rays per patient. The majority (84.9%) of the 436 primary affected rays had palmar nodules without contracture (Iselin I), only 49 rays (10.7%) had an Iselin score higher than I. Eight rays had been successfully operated on for DD, and in 20 rays recurrent disease was present (Figure 2).

Potential risk factors for DD

The prevalence increased from 4.9% in participants aged 50-55 years to 52.6% among those aged 76-80 years (Table 3). The median age of participants with DD was higher compared to patients without the disease, 68 years (IQR 62-77.5) and 59 years (IQR 55-67) respectively (P < 0.001). DD was more common in males than in females; in total 92 males and 77 females were affected, resulting in a prevalence of 26.4% in males and 18.6% in females (logistic regression adjusted for age categories: P = 0.007; OR 1.67; 95% CI 1.15-2.24).

Table 2. Prevalence of three study parameters in the general population of The Netherlands and our study population

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>The Netherlands</th>
<th>Study population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Age category</td>
<td>%</td>
</tr>
<tr>
<td>Smoking</td>
<td>50-55</td>
<td>31.6</td>
</tr>
<tr>
<td></td>
<td>56-65</td>
<td>26.1</td>
</tr>
<tr>
<td></td>
<td>66-75</td>
<td>17.6</td>
</tr>
<tr>
<td></td>
<td>&gt; 75</td>
<td>10.5</td>
</tr>
<tr>
<td>Alcohol consumption</td>
<td>50-55</td>
<td>9.2</td>
</tr>
<tr>
<td>(&gt;20/week)</td>
<td>56-65</td>
<td>10.1</td>
</tr>
<tr>
<td></td>
<td>66-75</td>
<td>11.3</td>
</tr>
<tr>
<td></td>
<td>&gt; 75</td>
<td>5.5</td>
</tr>
<tr>
<td>Diabetes</td>
<td>50-55</td>
<td>5.1</td>
</tr>
<tr>
<td></td>
<td>56-65</td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td>66-75</td>
<td>15.5</td>
</tr>
<tr>
<td></td>
<td>&gt; 75</td>
<td>16.1</td>
</tr>
</tbody>
</table>

SE: standard error, “ data from the central bureau of statistics, Statistics Netherlands

The difference in prevalence for the hands and fingers was tested with generalized estimating equations (GEE), excluding successfully operated rays. The results showed that there was no interaction effect between fingers and hands (P = 0.21). However, a difference between fingers was detected (P < 0.001). The most frequently affected ray was the ring finger, followed by the middle finger and little finger (Figure 3). Pairwise comparison of differences between fingers showed that prevalence of all fingers differed significantly from each other, except for the prevalence of the middle finger and little finger (P = 0.20).
Prevalence of Dupuytren Disease in The Netherlands

Table 3. Prevalence in different age categories

<table>
<thead>
<tr>
<th>Age</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>DD+</td>
<td>DD %</td>
</tr>
<tr>
<td>50-55</td>
<td>162</td>
<td>8</td>
<td>4.9</td>
</tr>
<tr>
<td>56-60</td>
<td>174</td>
<td>22</td>
<td>12.6</td>
</tr>
<tr>
<td>61-65</td>
<td>146</td>
<td>29</td>
<td>19.9</td>
</tr>
<tr>
<td>66-70</td>
<td>99</td>
<td>28</td>
<td>28.3</td>
</tr>
<tr>
<td>71-75</td>
<td>61</td>
<td>24</td>
<td>39.3</td>
</tr>
<tr>
<td>76-80</td>
<td>57</td>
<td>30</td>
<td>52.6</td>
</tr>
<tr>
<td>81-85</td>
<td>31</td>
<td>16</td>
<td>51.6</td>
</tr>
<tr>
<td>86-90</td>
<td>33</td>
<td>12</td>
<td>36.4</td>
</tr>
<tr>
<td>Total</td>
<td>763</td>
<td>169</td>
<td>22.1</td>
</tr>
</tbody>
</table>

Number and percentages of participants with DD (DD+) in males, females and total population.

Other statistically significant risk factors for DD seen in our population were hand injury in the past, excessive alcohol consumption, familial occurrence of DD, and presence of Ledderhose disease (Table 4).

Prediction model

The final analyses were conducted to determine a logistic prediction model for the prevalence of DD. Age was entered as both a linear and quadratic effect. Table 5 shows the coefficients of the final prediction model in the logit scale after applying backward elimination. This model can be used to estimate the prevalence of DD in males and females, depending on the presence of certain risk factors (Figure 4). The model was investigated for its goodness-of-fit by adding interactions between age and age squared and the other risk factors, but none of the interactions was significant (P > 0.175). This goodness-of-fit test was not conducted for Ledderhose disease, because there were too few events to fit a reliable quadratic model in age for each subgroup. Furthermore, the Hosmer-Lemeshow test did not demonstrate a lack of fit of the prediction model (P = 0.274).
The purpose of this study was two-fold: first, to investigate the prevalence of DD in the general population aged 50 years and older in The Netherlands; and second, to study the association between DD and potential risk factors. We conducted a cross-sectional study with a stratified random sample by age of 1360 individuals. In total 763 eventually participated. Our study revealed a prevalence of 22.1% (95% CI 19.2 – 25.0). Males were more often affected with DD than females, and prevalence increased with age from 4.9% in age category 50-55 years up to 52.6% in participants between 76 and 80 years of age.

Table 4. Potential risk factors among patients with DD and the reference cohort

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Dupuytren Disease (n = 160) (%)</th>
<th>Reference cohort (n = 594) (%)</th>
<th>Odds ratio (95% CI)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age category (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-55</td>
<td>8 (4.7)</td>
<td>154 (25.9)</td>
<td>1 (NA)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>56-60</td>
<td>22 (13.0)</td>
<td>152 (25.6)</td>
<td>2.87 (1.20-6.45)</td>
<td></td>
</tr>
<tr>
<td>61-65</td>
<td>29 (17.2)</td>
<td>117 (19.7)</td>
<td>4.77 (2.10-10.82)</td>
<td></td>
</tr>
<tr>
<td>66-70</td>
<td>28 (16.6)</td>
<td>71 (12.0)</td>
<td>7.59 (3.30-17.49)</td>
<td></td>
</tr>
<tr>
<td>71-75</td>
<td>24 (14.2)</td>
<td>37 (6.2)</td>
<td>12.49 (5.20-30.01)</td>
<td></td>
</tr>
<tr>
<td>76-80</td>
<td>30 (17.8)</td>
<td>27 (4.5)</td>
<td>21.39 (8.87-51.60)</td>
<td></td>
</tr>
<tr>
<td>81-85</td>
<td>16 (9.5)</td>
<td>15 (2.5)</td>
<td>20.53 (7.55-55.85)</td>
<td></td>
</tr>
<tr>
<td>86-90</td>
<td>12 (7.1)</td>
<td>21 (3.5)</td>
<td>11.00 (4.03-30.02)</td>
<td></td>
</tr>
<tr>
<td>Male gender</td>
<td>92 (54.4)</td>
<td>256 (43.1)</td>
<td>1.67 (1.15-2.24)</td>
<td>0.007*</td>
</tr>
<tr>
<td>Smoking</td>
<td>30 (17.8)</td>
<td>154 (25.9)</td>
<td>0.83 (0.52-1.33)</td>
<td>0.43</td>
</tr>
<tr>
<td>Alcohol consumption &gt;15</td>
<td>21 (12.4)</td>
<td>43 (7.3)</td>
<td>2.37 (1.28-4.39)</td>
<td>0.006*</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>27 (16.0)</td>
<td>59 (9.9)</td>
<td>1.17 (0.69-1.99)</td>
<td>0.56</td>
</tr>
<tr>
<td>Epilepsy</td>
<td>5 (3.0)</td>
<td>4 (0.7)</td>
<td>4.03 (1.01-16.04)</td>
<td>0.05</td>
</tr>
<tr>
<td>Hand injury</td>
<td>54 (32.1)</td>
<td>153 (25.8)</td>
<td>1.56 (1.04-2.35)</td>
<td>0.03*</td>
</tr>
<tr>
<td>Manual labor</td>
<td>59 (35.1)</td>
<td>215 (36.3)</td>
<td>0.91 (0.62-1.34)</td>
<td>0.63</td>
</tr>
<tr>
<td>Family history</td>
<td>40 (23.7)</td>
<td>47 (7.9)</td>
<td>3.04 (1.83-5.05)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Ledderhose disease</td>
<td>10 (5.9)</td>
<td>1 (0.2)</td>
<td>39.36 (4.86-318.95)</td>
<td>0.001*</td>
</tr>
<tr>
<td>Knuckle pads</td>
<td>31 (19.6)</td>
<td>85 (14.4)</td>
<td>1.48 (0.90-2.44)</td>
<td>0.12</td>
</tr>
</tbody>
</table>

95% CI: 95% confidence interval. * Statistically significant difference between participants with DD and reference cohort in logistic regression analysis.
† Adjusted for age categories in logistic regression analysis.
‡ Adjusted for age categories and gender in logistic regression analysis.

Table 5. Prediction model for prevalence of DD

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>B</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-1.146</td>
<td>-1.4772 to -0.81476</td>
</tr>
<tr>
<td>Age</td>
<td>1.093</td>
<td>0.8183 to 1.3678</td>
</tr>
<tr>
<td>Age^2</td>
<td>-0.294</td>
<td>-0.4813 to -0.1075</td>
</tr>
<tr>
<td>Male gender</td>
<td>0.460</td>
<td>0.0676 to 0.8523</td>
</tr>
<tr>
<td>Alcohol consumption (&gt;15 units/week)</td>
<td>0.801</td>
<td>0.1459 to 1.4564</td>
</tr>
<tr>
<td>Family history</td>
<td>1.156</td>
<td>0.6337 to 1.6776</td>
</tr>
<tr>
<td>Ledderhose disease</td>
<td>3.489</td>
<td>1.4032 to 5.5738</td>
</tr>
</tbody>
</table>

95% CI: 95% confidence interval.

Discussion

The purpose of this study was two-fold: first, to investigate the prevalence of DD in the general population aged 50 years and older in The Netherlands; and second, to study the association between DD and potential risk factors. We conducted a cross-sectional study with a stratified random sample by age of 1360 individuals. In total 763 eventually participated. Our study revealed a prevalence of 22.1% (95% CI 19.2 – 25.0). Males were more often affected with DD than females, and prevalence increased with age from 4.9% in age category 50-55 years up to 52.6% in participants between 76 and 80 years of age.
Our findings are in agreement with results from Zerajic and Degreer, with prevalence rates of 25.4% and 31.6%, respectively, in the general population of males and females older than 50 years. The majority of our participants only had palmar nodules; contractures were rarely seen. This is in accordance with the findings of others. Some authors who performed studies in a nonhospital environment have found lower prevalence rates, ranging from 5.6% to 13.5%. There are several possible explanations for this variability in prevalence, such as regional differences, since most of these prior studies were performed in Scandinavia. Second, some of the studied populations seem to be much younger than our population. In the case of the 6% prevalence published by Bergenudd, the difference may be explained by a difference in diagnostic criteria, because they examined the hands for “Dupuytren’s contracture”, whereas we included the features: tethered skin, nodules, cords, and contractures.

Another cause for variability in prevalence might be a difference in experience with DD between the investigators. In the literature, an article by Noble et al. is often cited as an example of a discrepancy in prevalence when a physician diagnoses the disease (18%) compared with a hand surgeon (42%). It is frequently suggested that the physician may have missed DD. We think that such a conclusion is unjustified, since the disease was diagnosed in two different populations that did not have similar baseline characteristics. A Danish study carried out by a nurse and a medical student also found a low prevalence of 11%. However, a study in Bosnia, carried out by a junior clinician, reported a high rate of DD, suggesting that less experienced researchers may not underestimate prevalence. These discrepancies complicate interpreting the importance of experience in relation to the prevalence found, especially because the prevalence figures concern different countries.

The incidence of operative intervention and recurrent disease was low in our study population. It is difficult to compare these rates with the population at large, because data about the incidence of surgical procedures for DD in the general population are not readily available. Furthermore, the majority of prevalence studies investigated merely the prevalence of current DD, and did not show data about intervention rates or recurrent disease in their study population. In 1999, Rayan suggested that there are two types of DD, namely, typical DD and atypical DD. Patients with typical DD have progressive disease which often requires surgical intervention. In contrast, patients with atypical disease have a mild form of the disease that is usually located only in the palm of the hand. This form is nonprogressive, and treatment is rarely indicated. The low incidence of surgical intervention in our study population might suggest that atypical DD is common in the general population.

A secondary goal of this study was to investigate the role of potential risk factors in the development of DD. In our population, a female-to-male ratio of 1:1.2 was found. It is interesting that in several studies aimed at treatment of DD a different gender distribution was observed, ranging from 1.3:8 to 1:5. This might suggest that the course of the disease is different in females and that treatment is less frequently performed in females than in males.

We know from previous studies that prevalence rises with age. This was supported by our results; prevalence increased strongly with rising age to a maximum prevalence of 52.6%. However, in the highest age categories a downward trend in prevalence was seen. Because of our age stratification, we believe this to be a reliable result. This finding is in agreement with some indications that patients with DD might have an increased mortality rate. In contrast, in some studies prevalence rates continued to rise with age. Therefore, the implications of this finding are difficult to interpret.

In the multivariable analyses, we adjusted for age categories because we stratified age into eight categories. In addition, in some analyses we also adjusted for gender as this might have been a confounder in certain variables, such as smoking and alcohol consumption.

In our population, there was no association between DD and diabetes in the multivariable analysis corrected for age and gender. This was in agreement with results from other studies. Some other researchers did find a significant difference in prevalence between patients with diabetes and their control group, but it is not clear whether this effect was adjusted for age. Several authors have tried to elucidate the association between DD and diabetes. An explanation for this association might be that microvascular changes in diabetes result in local hypoxia. This hypoxia may induce the activation of several cellular pathways, eventually resulting in formation of fibromatous tissue. However, as mentioned, the results on this topic are contradictory.

Smoking has been associated with DD. It is well known that smoking affects the peripheral circulation; this could result in peripheral hypoxia as mentioned before, and may explain the association between smoking and DD. Our findings, however, do not support this hypothesis, because smoking was not a risk factor for disease.
factor in our population, nor was smoking identified as a risk factor in several other studies. Other previously associated risk factors that could not be linked to DD in our population are epilepsy and manual labor.

The following risk factors for DD were statistically significant in our multivariable analysis: age, male gender, hand injury in the past, excessive alcohol consumption, family history of DD, and presence of Ledderhose disease. After backward elimination, we have been able to determine a logistic prediction model for the prevalence of DD with all these factors except hand injury in the past. This model can be used to estimate the prevalence in males and females depending on the presence of the above-mentioned risk factors. Most parameter estimates of risk factors incorporated in the final model have a small confidence interval, but the confidence interval of Ledderhose disease is very broad because of the small number of events. Therefore, we considered the outcome of this potential risk factor less reliable and did not include this variable in the figures of our prediction model.

One of the strengths of this study was our sampling method. Because we drew a random sample stratified by age, we were able to include enough participants in each age category. Furthermore, we visited potential participants at home, which increased the willingness to participate. Nonetheless, we did not entirely reach the number of desired participants. The proportion of nonresponders was not equally distributed across age categories, and nonresponders were significantly older than the participants. This may have resulted in an underestimation of the prevalence of DD. Indeed, a weighted analysis, where the weights were selected to make the sample size in the same ratio with the population sizes, resulted in a prevalence of 23.7%. This is close to our result of 22.1%, so the imbalance in nonresponse across age categories apparently had a minimal effect on our estimate. Another strength of our study is that we compared our results with available data from the Central Bureau of Statistics in The Netherlands. Because there were no explicit differences in outcome, it can be assumed that our study population accurately represents the general population in The Netherlands.

This study shows that DD—particularly, the nodular form—is common among citizens of The Netherlands aged 50 years and older. DD is highly age dependent, and is more frequently seen in males than in females. A logistic prediction model was developed to estimate the prevalence of DD based on the presence of the significant risk factors gender, age, alcohol consumption, presence of Ledderhose disease, and a positive family history of DD.

References

Prevalence of Dupuytren Disease in The Netherlands


