Fibromyalgia PubMed

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12/9/2019

This script takes ten articles from the abstracts on earache articles from NCBI's PubMed

This creates a directory to stem the abstracts and preprocess from the csv file into a corpus of 20 files in a folder called Earache.

```
Auto <- read.csv('Fibromyalgia_PubMed_Abstracts.csv', sep=',',
                 header=TRUE, na.strings=c('',' '))

auto <- Auto[complete.cases(Auto$abstract),]


dir.create('./Fibromyalgias')

ea <- as.character(auto$abstract)
setwd('./Fibromyalgias')

for (j in 1:length(ea)){
  write(ea[j], paste(paste('EA',j, sep='.'), '.txt', sep=''))
}
setwd('../')
```

This code preprocesses and stems the corpus

```
library(tm)
library(SnowballC)
library(wordcloud)
library(ggplot2)

Fibromyalgias <- Corpus(DirSource("Fibromyalgias"))


Fibromyalgias
```

```
## <<SimpleCorpus>>
## Metadata:  corpus specific: 1, document level (indexed): 0
## Content:  documents: 20
```

```
#Fibromyalgias <- tm_map(Fibromyalgias, removePunctuation)
#Fibromyalgias <- tm_map(Fibromyalgias, removeNumbers)
Fibromyalgias <- tm_map(Fibromyalgias, tolower)
Fibromyalgias <- tm_map(Fibromyalgias, removeWords, stopwords("english"))
Fibromyalgias <- tm_map(Fibromyalgias, stripWhitespace)
Fibromyalgias <- tm_map(Fibromyalgias, stemDocument)
```

```
dtmFibromyalgias <- DocumentTermMatrix(Fibromyalgias)

freq <- colSums(as.matrix(dtmFibromyalgias))
```

This code orders words stemmed by frequency and finds input correlations

```
FREQ <- data.frame(freq)
ord <- order(freq, decreasing=TRUE)

freq[head(ord, 25)]
```

```
##         pain      patient fibromyalgia        sleep        studi
##           60           54           51           36           28
##        group    treatment          use      qualiti       effect
##           22           22           22           22           19
##       associ       assess     signific       clinic       differ
##           19           18           18           17           17
##         week      chronic      symptom          fms        score
##           15           15           15           14           14
##       measur         mind       includ       diseas       higher
##           12           12           11           11           11
```

```
findAssocs(dtmFibromyalgias, "sleep", corlimit=0.7)
```

```
## $sleep
##         disturb         anxieti            mind           (93%
##            0.82            0.77            0.76            0.74
##           (five         (hospit     (pittsburgh          (promi
##            0.74            0.74            0.74            0.74
##           (psqi           -.24,           -.31,           -.58,
##            0.74            0.74            0.74            0.74
##          -0.23,          -0.54,         .0001),         .0001).
##            0.74            0.74            0.74            0.74
##          .001),          .002)           .002;            177
##            0.74            0.74            0.74            0.74
##             59%   [promis-sd]),         [psqi],            aim:
##            0.74            0.74            0.74            0.74
##        anxiety;            asia      australia,         cultiv
##            0.74            0.74            0.74            0.74
##     depression;    disturbance.         female;        interfer
##            0.74            0.74            0.74            0.74
##  interference),   interference,            john           kg/m2
##            0.74            0.74            0.74            0.74
##           leagu      longitudin          mediat      mediation;
##            0.74            0.74            0.74            0.74
##         method:           pacif          patent         pearson
##            0.74            0.74            0.74            0.74
##           peopl         potenti        previous        problems,
##            0.74            0.74            0.74            0.74
##           promi       promis-sd questionnaire),    relationship
##            0.74            0.74            0.74            0.74
##   relationship.         scale).          sleep.             son
```

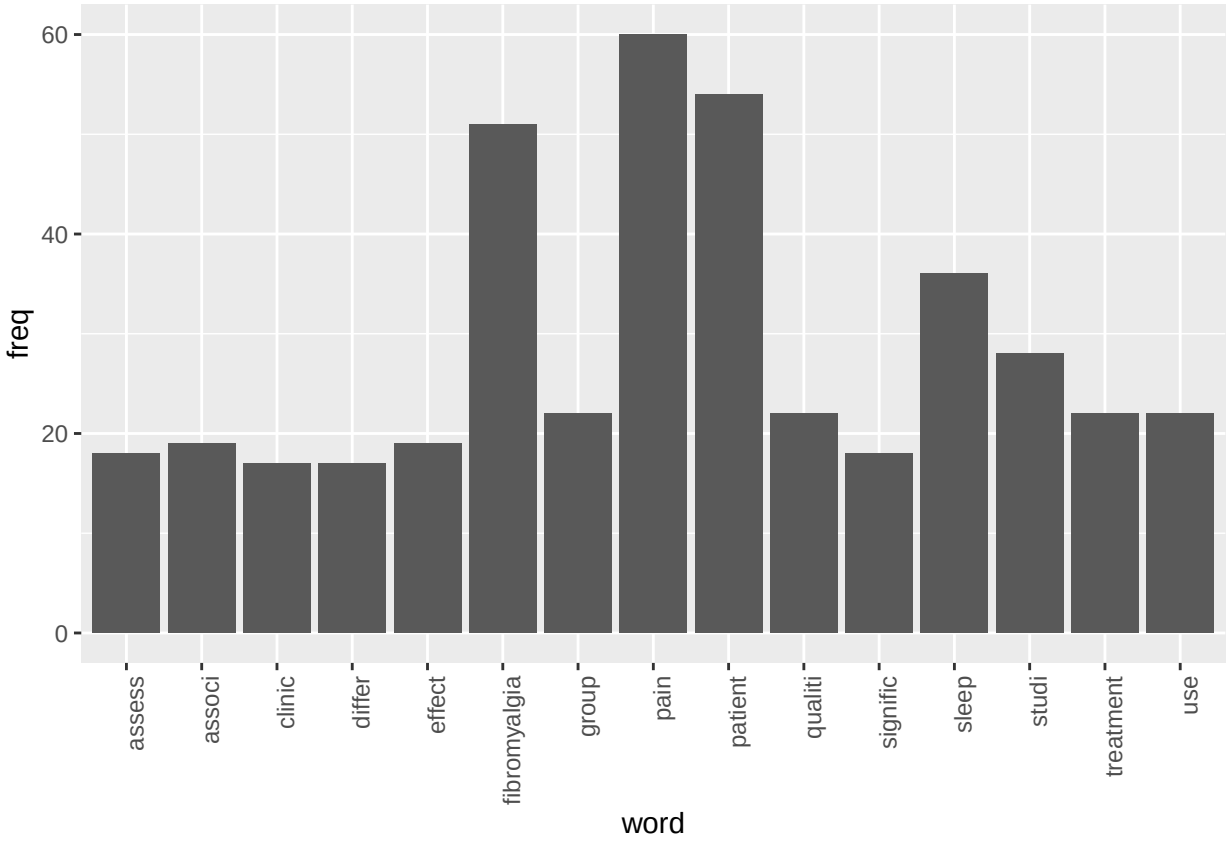
```
##            0.74            0.74            0.74            0.74
##          suffer      unstudied.         warrant         white).
##            0.74            0.74            0.74            0.74
##           wiley          years;       patients.
##            0.74            0.74            0.73
```

```
findAssocs(dtmFibromyalgias, "pain", corlimit=0.5)
```

```
## $pain
##                   (especi                  (myofasci
##                      0.81                       0.81
##                      .e.,                     areas,
##                      0.81                       0.81
##                    attack                     bowel
##                      0.81                       0.81
##              cervico-faci                  co-occur,
##                      0.81                       0.81
##                 co-occurr            co-occurrence;
##                      0.81                       0.81
##                   concurr                condition.
##                      0.81                       0.81
##                districts. dysmenorrhea/endometriosi
##                      0.81                       0.81
##                   express                       give
##                      0.81                       0.81
##                   headach                  headache.
##                      0.81                       0.81
##                 headache;                     heart
##                      0.81                       0.81
##             hyperalgesia,                   influenc
##                      0.81                       0.81
##                     input                     irrit
##                      0.81                       0.81
##                    ischem                     least
##                      0.81                       0.81
##                    locat                     messag
##                      0.81                       0.81
##                   migrain                  migraine;
##                      0.81                       0.81
##           multifactorial;                     mutual
##                      0.81                       0.81
##                  myofasci                     organ
##                      0.81                       0.81
##                     pain)                     pain),
##                      0.81                       0.81
##                     paper                       part
##                      0.81                       0.81
##                particular,            pathophysiolog
##                      0.81                       0.81
##                   perpetu                 phenomena
##                      0.81                       0.81
##                   points,                   probabl
##                      0.81                       0.81
##                   process                   project
```

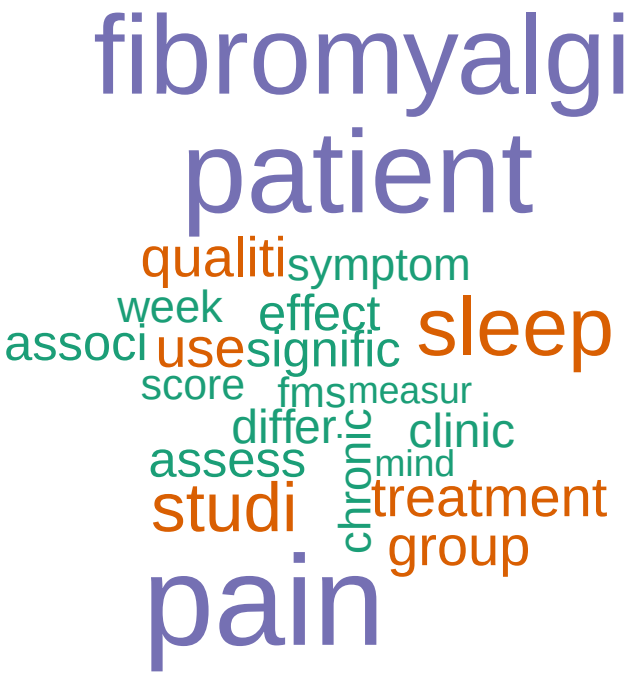
```
##                      0.81                      0.81
##                     refer                      rise
##                      0.81                      0.81
##                   sensori                     share
##                      0.81                      0.81
##                    strong                 suffering.
##                      0.81                      0.81
##                    summar                  syndrome,
##                      0.81                      0.81
##                      tend                tension-typ
##                      0.81                      0.81
##                   trigger                     typic
##                      0.81                      0.81
##                   urinari                   various
##                      0.81                      0.81
##                    viscer             viscero-viscer
##                      0.81                      0.81
##                     ways.                    intern
##                      0.81                      0.74
##                   central                    condit
##                      0.72                      0.72
##                       one                  interact
##                      0.72                      0.70
##                     modul                       can
##                      0.65                      0.63
##              musculoskelet                   symptom
##                      0.61                      0.59
##                    enhanc                hyperalgesia
##                      0.59                      0.59
##                   nocicept                  observed.
##                      0.59                      0.59
##                     under                     among
##                      0.59                      0.53
##                      will
##                      0.51
```

```
wf <- data.frame(word=names(freq), freq=freq)
p <- ggplot(subset(wf, freq>16), aes(word, freq))
p <- p + geom_bar(stat= 'identity')
p <- p + theme(axis.text.x=element_text(angle=90, hjust=1))
p
```

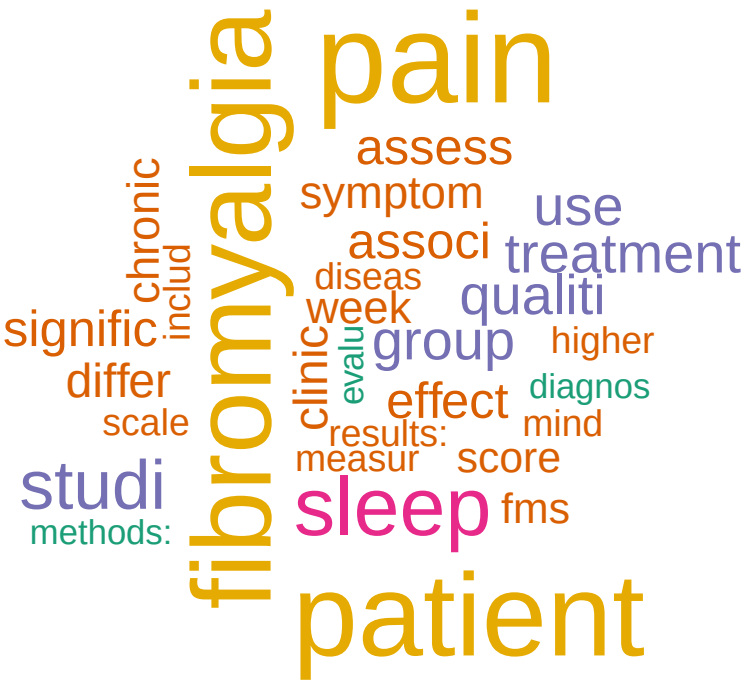



```
wordcloud(names(freq), freq, min.freq=12,colors=brewer.pal(1,'Dark2'))
```

```
## Warning in brewer.pal(1, "Dark2"): minimal value for n is 3, returning requested palette with 3 diff
```




```
wordcloud(names(freq), freq, max.words=30,colors=brewer.pal(6,'Dark2'))
```



The above stemmed the corpus, this will lemmatize the original csv file

and add the field to the table and write out to csv, followed by plot the word count frequencies that were lemmatized and the word clouds

```
library(textstem)

lemma <- lemmatize_strings(auto$abstract, dictionary=lexicon::hash_lemmas)

Lemma <- as.data.frame(lemma)
Lemma <- cbind(Lemma, auto)

colnames(Lemma) <- c('lemmatizedAbstract','abstract', 'source')

write.csv(Lemma, 'LemmatizedFibromyalgias.csv', row.names=FALSE)
```

```
dir.create('./Fibromyalgias-Lemma')

ea <- as.character(Lemma$lemmatizedAbstract)
setwd('./Fibromyalgias-Lemma')

for (j in 1:length(ea)){
  write(ea[j], paste(paste('EAL',j, sep='.'), '.txt', sep=''))
}
setwd('../')
```

```r
library(tm)
library(SnowballC)
library(wordcloud)
library(ggplot2)
```

```r
Fibromyalgias <- Corpus(DirSource("Fibromyalgias-Lemma"))

Fibromyalgias
```

```
## <<SimpleCorpus>>
## Metadata:  corpus specific: 1, document level (indexed): 0
## Content:  documents: 20
```

```r
#Fibromyalgias <- tm_map(Fibromyalgias, removePunctuation)
#Fibromyalgias <- tm_map(Fibromyalgias, removeNumbers)
Fibromyalgias <- tm_map(Fibromyalgias, tolower)
Fibromyalgias <- tm_map(Fibromyalgias, removeWords, stopwords("english"))
Fibromyalgias <- tm_map(Fibromyalgias, stripWhitespace)

dtmFibromyalgias <- DocumentTermMatrix(Fibromyalgias)
dtmFibromyalgias
```

```
## <<DocumentTermMatrix (documents: 20, terms: 1344)>>
## Non-/sparse entries: 2242/24638
## Sparsity           : 92%
## Maximal term length: 21
## Weighting          : term frequency (tf)
```

```r
freq <- colSums(as.matrix(dtmFibromyalgias))

FREQ <- data.frame(freq)
ord <- order(freq, decreasing=TRUE)

freq[head(ord, 25)]
```

```
##         pain      patient fibromyalgia        sleep        study
##           60           55           52           36           29
##        group    treatment      quality          use        score
##           23           23           23           22           18
##          fms         high      symptom         much     analysis
##           17           17           16           15           14
##     clinical       effect         good      chronic        mdhaq
##           14           14           14           14           13
##        scale  significant         week       report  mindfulness
##           13           12           12           12           12
```

```r
patient <- as.data.frame(findAssocs(dtmFibromyalgias, "patient", corlimit=0.70))

pain <- as.data.frame(findAssocs(dtmFibromyalgias, "pain", corlimit=0.75))
```

```
treatment <- as.data.frame(findAssocs(dtmFibromyalgias, "treatment", corlimit=0.55))

patient
```

```
##          patient
## key         0.77
## presence    0.74
```

```
pain
```

```
##                 pain
## area,           0.85
## attack          0.85
## bowel           0.85
## cervico         0.85
## concurrent      0.85
## district.       0.85
## dysmenorrhea    0.85
## e.,             0.85
## endometriosis   0.85
## enhancement     0.85
## especially      0.85
## expression      0.85
## facial          0.85
## headache        0.85
## headache.       0.85
## headache;       0.85
## heart           0.85
## hyperalgesia,   0.85
## influence       0.85
## input           0.85
## internal        0.85
## irritable       0.85
## ischemic        0.85
## less            0.85
## locate          0.85
## message         0.85
## migraine        0.85
## migraine;       0.85
## multifactorial; 0.85
## mutual          0.85
## myofascial      0.85
## occur,          0.85
## occurrence      0.85
## occurrence;     0.85
## organ           0.85
## paper           0.85
## part            0.85
## particular,     0.85
## pathophysiology 0.85
## perpetuate      0.85
## phenomenon      0.85
```

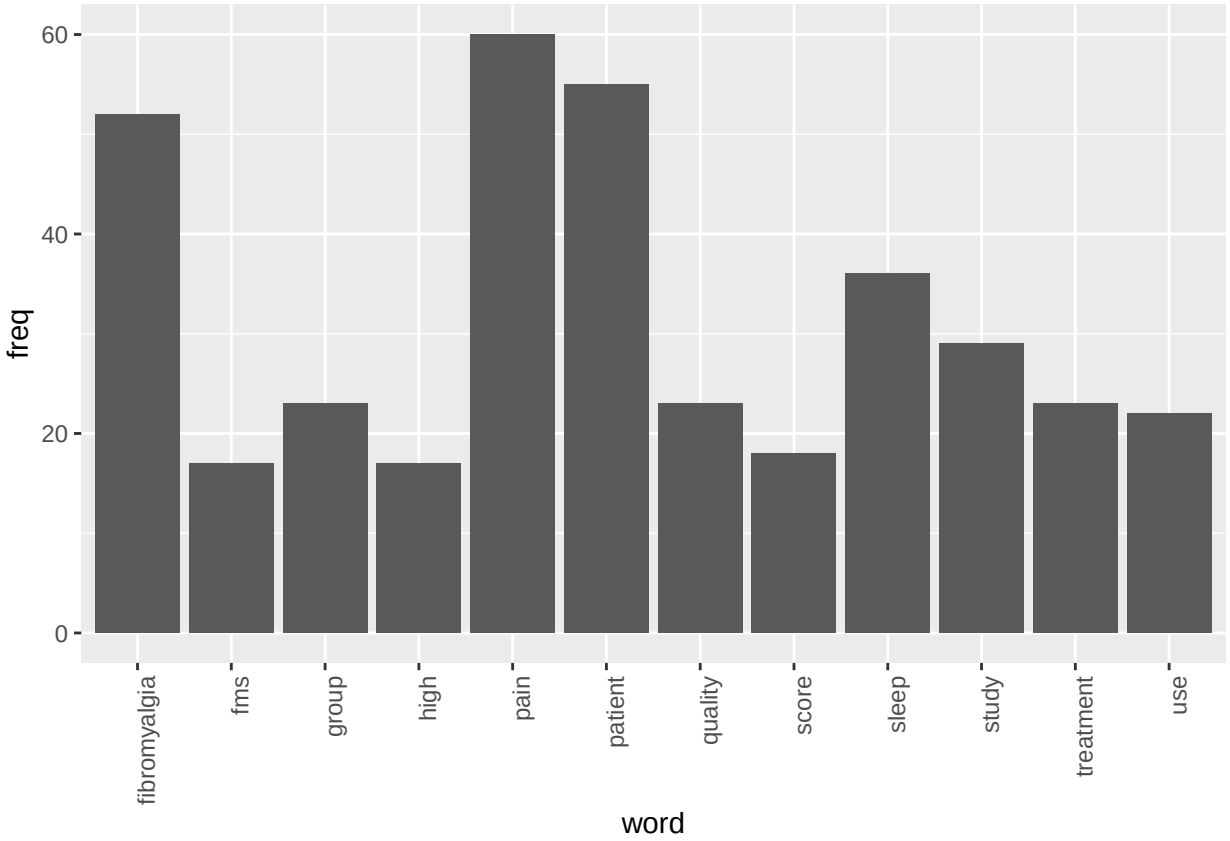
```
## point,          0.85
## probably        0.85
## process         0.85
## projection      0.85
## refer           0.85
## rise            0.85
## sensory         0.85
## share           0.85
## strong          0.85
## suffer.         0.85
## summarize       0.85
## tend            0.85
## tension         0.85
## thorough        0.85
## trigger         0.85
## typical         0.85
## urinary         0.85
## various         0.85
## visceral        0.85
## viscero         0.85
## way.            0.85
## modulation      0.79
## interaction     0.75
```

```
treatment
```

```
##                treatment
## eligible            0.84
## outpatient          0.76
## 1st                 0.73
## 60,                 0.73
## acr                 0.73
## back                0.73
## balneological       0.73
## balneotherapy;      0.73
## blind,              0.73
## blind.              0.73
## delivery            0.73
## except              0.73
## fiq                 0.73
## fms.                0.73
## full                0.73
## hydrotherapy        0.73
## hydrotherapy;       0.73
## immersion           0.73
## intensity           0.73
## intention           0.73
## intermittent        0.73
## judgment            0.73
## mcid                0.73
## method.             0.73
## min                 0.73
## month.              0.73
## mud                 0.73
```

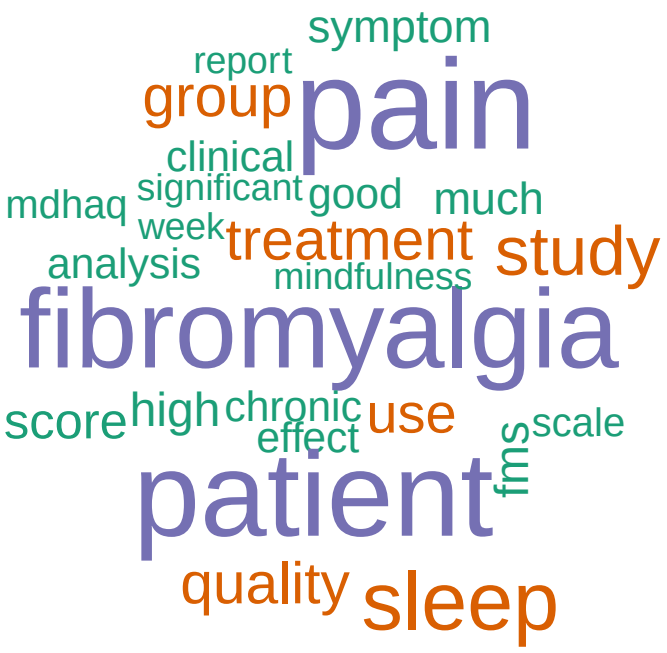
```
## pack                0.73
## parallel            0.73
## peloidotherapy      0.73
## region              0.73
## seem                0.73
## statistical         0.73
## tap                 0.73
## time                0.73
## water               0.73
## øc                  0.73
## øc.                 0.73
## consecutive         0.69
## 2010                0.62
## application         0.62
## assign              0.62
## clinic.             0.62
## completion          0.62
## difference          0.62
## important           0.62
## randomly            0.62
## group.              0.58
```

```
wf <- data.frame(word=names(freq), freq=freq)
p <- ggplot(subset(wf, freq>16), aes(word, freq))
p <- p + geom_bar(stat= 'identity')
p <- p + theme(axis.text.x=element_text(angle=90, hjust=1))
p
```




```
wordcloud(names(freq), freq, min.freq=12,colors=brewer.pal(2,'Dark2'))
```

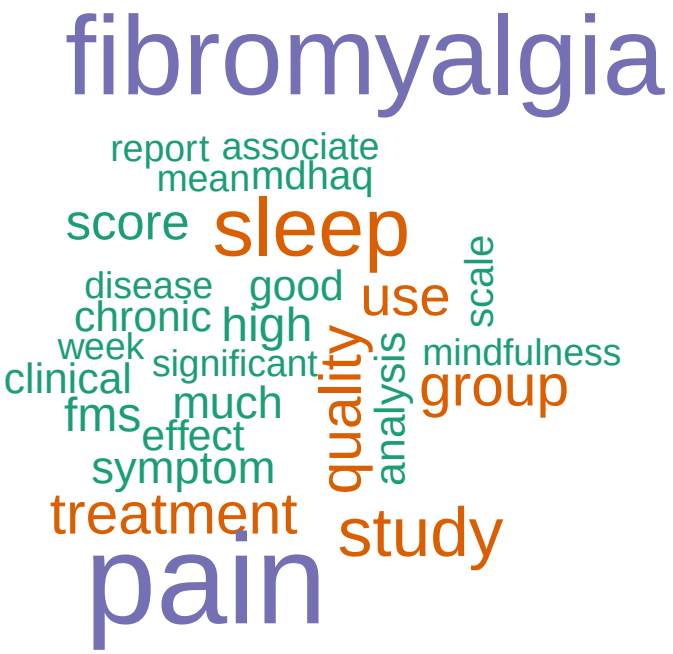
```
## Warning in brewer.pal(2, "Dark2"): minimal value for n is 3, returning requested palette with 3 diff
```




```
wordcloud(names(freq), freq, max.words=28,colors=brewer.pal(1,'Dark2'))
```

```
## Warning in brewer.pal(1, "Dark2"): minimal value for n is 3, returning requested palette with 3 diff
```

```
## Warning in wordcloud(names(freq), freq, max.words = 28, colors =
## brewer.pal(1, : patient could not be fit on page. It will not be plotted.
```


fibromyalgia
report
associate
mean
mdhaq
score
sleep
disease
good
use
scale
chronic
high
week
significant
mindfulness
clinical
quality
analysis
group
much
fms
effect
symptom
treatment
study
pain