To the Editor, Self-pulse palpation is commonly used to measure heart rate, and increasingly, it is being advocated as a self-check for detecting atrial fibrillation where an ‘irregularly irregular’ pulse is a characteristic feature. High-profile campaigns such as the ‘Know Your Pulse campaign’ have promoted self-pulse checking. It is surprising then that the self-pulse palpation campaign’s such as the ‘Know Your Pulse campaign’2 have promoted self-pulse palpation. Hence sub-participation from the radial artery as published instructions on performing self-pulse palpation and their potential impact on arrhythmia detection.

We conducted a simple experiment to assess the changes in heart rate characteristics resulting from self-pulse palpation. The study was approved by the University Ethical Review Panel and conducted in accordance with the principles of the Declaration of Helsinki. All participants provided written informed consent. Prior to participation, subjects received a participant information sheet and written instructions on performing self-pulse palpation from the radial artery as published by the UK’s Arrhythmia Alliance for their Know Your Pulse campaign. Hence subjects could practice self-pulse palpation before commencing the study. The experiment required participants to determine their heart rate by self-pulse palpation over a 30 s period, the optimum duration according to a previous study. ECG lead I was recorded for 30 s immediately before (reference period) and during self-pulse palpation while seated in a quiet environment. The experiment was repeated in all subjects.

ECG recordings were analysed to determine changes in heart rate characteristics during reference (ie, no self-pulse palpation) and self-pulse palpating conditions. ECG parameters were measured automatically by custom software separately for the first and repeat experiments. Intervals between beats were measured as the duration between successive R waves (RR interval). Visual inspection of all recordings with annotated beats confirmed correct operation of the algorithm. RR interval time-series was denoted rr (1…n) and the following parameters were calculated.

\[
\text{Mean RR intervals : } RR = \frac{1}{n} \sum_{i=1}^{n} rr(i)
\]

\[
\text{Standard deviation of RR intervals : } \text{SD} = \left( \frac{1}{n-1} \sum_{i=1}^{n} (rr_i - RR)^2 \right)^{\frac{1}{2}}
\]

Regularity of RR intervals, defined by Lake and Moorman as the coefficient of sample entropy (COSEn):

\[
\text{COSEn} = -\log(B) - \log(A) - \log(2r) - \log(RR)
\]

where A and B are the total number of sequences in rr, of length m+1 and m respectively, which match within a tolerance r. As specified by Lake and Moorman, tolerance r is determined from the ‘minimum numerator count criterion’ such that r is allowed to increase until the minimum value of A is 5 and sequence length m is chosen to be 1. Further details given in reference. Rhythms with regular beat intervals have greater negative COSEn than rhythms with irregular beat intervals.

Descriptive statistics are reported as mean±SD. The paired t test was used to determine significance of differences in ECG parameters between reference and self-pulse taking periods.

A total of 102 subjects (48 men and 54 women) with an age range of 18–61 years (39.5±21.5 years) were recruited. Two participants were unable to perform self-pulse palpation, and so were not recorded. Noise in two recordings in the first experiment and five recordings in the repeat experiment prevented reliable calculation of the parameters so measurements from 98 and 95 participants were analysed for each experiment, respectively.

Figure 1 summarises the measured ECG parameters for reference and self-pulse palpating conditions in each experiment. There was a small but statistically significant fall in mean RR interval during self-pulse palpation compared with the reference period in the first experiment (0.87±0.17 s vs 0.84±0.16 s, p<0.0001), but no significant effect when the experiment was repeated (0.87±0.16 s vs 0.86±0.16 s). RR intervals became less variable during self-pulse palpation as measured by SD and this was consistent for both experiments (61±30 ms vs 48 ms vs 31±16 ms).

Figure 1 Mean and SD of ECG parameters (RR, SD and COSEn) for reference and self-pulse palpating conditions for the two experiments indicated A and B.
±26 ms and 58±35 ms vs 47±29 ms, both p<0.00001). Heart rhythm regularity increased during self-pulse palpation as indicated by the greater negative COSEn compared with reference levels for both experiments (−1.37±0.40 vs −1.59±0.40 and −1.46±0.41 vs 1.64±0.40, both p<0.00001).

This first study to investigate the effects of self-pulse palpation on heart rate shows that self-pulse palpation significantly alters heart rate dynamics. The heart rhythm during self-pulse taking became less variable and more regular than without self-pulse taking. Variability, as measured by SD, reduced on average by 20% of reference values (13/61 and 11/58 for each experiment, respectively). Regularity, as measured by COSEn, increased on average by 14% of reference values (0.22/1.37 and 0.18/1.46 for each experiment, respectively). In the context of self-pulse palpation for self-checking of atrial fibrillation, on one hand, it is reassuring that variability during a cognitive challenge in young and older adults. Age Ageing 2002;31:131–5.

In conclusion, we believe this study has highlighted an important and overlooked phenomenon of self-pulse palpation and warrants further investigation in clinical groups. Particularly, this could have important implications for the use of self-pulse palpation as a diagnostic tool for atrial fibrillation where accurate characterisation of heart rate dynamics is important.

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