

Biofeedback For Hypertension

This disorder is one of the most common and vexing medical disorders in the Western world. Untreated hypertension (HT) is a contributing factor in premature death from stroke, kidney disease, and heart attack; elevated blood pressure affects some 50 million people in this country (Burt, Cutler, Higgins, Horan, Labarthe, Whelton, et al., 1995). Increased blood pressure (BP) risk factors include increasing age, diabetes, obesity, alcohol use, lack of exercise, high sodium diet, and chronic psychological stress (McGrady & Linden, 2003). There are significant gender and ethnic differences as well: Men have higher BP than women, and African-Americans have higher BP than Caucasians.

The explanation of the physiology of BP can be found in the book *Biofeedback* (Schwartz & Andrasik, 2003, p. 383 ff); it is too complex to review here. Briefly stated, baroreceptors (BR), located in the heart and its arterial walls, are sensitive to stretching which is a major factor in elevated BP. These receptors send messages to the medulla of the brain (which itself is a feedback loop). This is an important system, since the BR can influence hypertension within 5-10 seconds (see Schwartz & Andrasik, 2003, p. 383). What this means in terms of biofeedback is that by training the person's behavior, and including the brain in such training, HT can be positively influenced.

The Joint National Committee (JNC, 2004) meets every few years to classify the levels of HT as follows (for systolic BP): Less than 120 is normal. From 120-139 is prehypertension; over 140 is hypertension (HT), with the following categorizations: 140-159 is Stage 1; 160-179 is Stage 2; and Stage 3 is greater than 180. Over a decade ago, the 130 level would have been considered normal, but nowadays the level of over 130 warrants attention because of the prospect of future disease (JNC, 1997).

Although biofeedback has been known to be effective in lowering blood pressure (BP) for several decades, it seems to play a minor role in the medical treatment of cardiovascular disorders. Several meta-analytic studies have shown the effectiveness of biofeedback and other behavioral treatments. The review by Yucha and her colleagues (Yucha, Clark, Smith, Uris, Lafleur & Duval, 2001) revealed that both biofeedback and other active behavioral interventions resulted in lower systolic blood pressure (SBP) and/or diastolic blood pressure (DBP), with all treatments equally effective compared to no-treatment controls. The average reduction was modest but meaningful (6.7 mmHg for SBP, and 4.8mmHg for DBP; Yucha et al, 2001). Another meta-analysis by Nakao and his colleagues (2003) supported this conclusion reviewing 22 randomized controlled studies in which they found that biofeedback reduced DBP by 7.3 mmHg and SBP by 5.8 mmHg. Again, these results were equal to other behavioral treatments.

Lifestyle modification is commonly included in most biofeedback treatment, and a good example of this is the treatment of HT. The JNC (2004) recommends the following for such patients:

Lose weight if overweight

Adopt the DASH eating plan

Limit alcohol to one drink per day (8 oz wine, 24 oz beer, or 2 oz liquor)

Exercise aerobically on a regular basis

Reduce sodium intake to less than 100 millimol per day (<6 grams of salt)

Do not smoke

Reduce dietary saturated fat and cholesterol intake

Maintain adequate dietary potassium, calcium and magnesium intake

Explaining the rationale for each component of a lifestyle change can be helpful in gaining cooperation of the patient. For example, it could be explained that increased sodium causes retention of water and thereby increases BP because of the increased fluid in the body. Aggressive treatment of high BP decreases the incidence of morbidity and mortality from cardiovascular events (McGrady & Linden, 2003). The above lifestyle recommendations are often considered an integral part of the office practice of biofeedback, and the ones noted for hypertension could apply to many disorders.

Biofeedback is considered one component of many possible biobehavioral interventions. Early studies reported the effectiveness of biofeedback alone or combined with other relaxation treatments in lowering BP in those with hypertension (Patel, 1973; Benson, Shapiro, Tulskey, & Schwartz, 1971; McGrady, Yonker, Tan, Fine, & Woerner, 1981). What predicts whether a patient will be successful with biofeedback treatment for hypertension? Higher neurogenic tone (Cottier, Shapiro, & Julius, 1984), higher anxiety, forehead muscle tension and cortisol levels have been reported (McGrady, Utz, Woerner, Bernal, & Higgins, 1986).

An important issue in hypertension treatment research is how high the BP is when treatment is started. For example, subjects who enter a hypertension study with very high BP can be expected to show a more dramatic drop in blood pressure with treatment, thereby distorting the percentage of success rates in the study. Still, biofeedback has been found to be helpful at all levels of hypertension (Linden & Chambers, 1994).

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