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Research Article

Smoking Disturbs the Intrinsic Tendencies of Autonomic Nervous System Reflected in the Bioelectric Potential at 12 Alarm Points: A Pilot Study

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Abstract
Objectives: The objective of this study was to investigate the effect of smoking on the bioelectrical potential (BEP) at 12 alarm points.
Methods: A crossover study was conducted on 17 normal adult male smokers. The BEP was measured at 12 alarm points both before and after breathing through a filter (control) and smoking.
Results: The participants were classified into three subtypes according to the way in which their BEP changed after having breathed through a filter: increasing, decreasing, and irregular types. Compared with breathing through a filter, smoking decreased the BEP in the increasing type, whereas it increased the BEP in the decreasing type. No significant changes were observed in the irregular-type participants.
Conclusions: This study suggests that smoking increases sympathetic activity in smokers with a parasympathetic tendency, whereas it lessens sympathetic activity in smokers with a sympathetic tendency. Smoking does this by eliminating the intrinsic tendency of the autonomic nervous system, and these effects can be observed in the BEP at 12 alarm points.

1. Introduction

The meridian refers to the pathway for qi in the body, and the acupoint is the location where the qi of the meridian appears on the body's surface. The meridian system has been used for diagnosing the state of internal organs because contextual correlations exist between the meridians and the internal organs. An alarm point, a type of acupoint where the qi of internal organs and meridians gathers in the chest and the abdomen, has been preferably used for clinical diagnosis [1].

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The electrical properties of the skin have commonly been used to study meridians and acupoints [2]. Especially, the bioelectric potential (BEP) of the skin is proportional to its bioelectric capacitance and is considered to be a reproducible parameter because it is unaffected by the humidity of the skin [3–5].

Smoking is known to cause abnormal circulation in the human body and increase the prevalence of various diseases by disturbing the autonomic nervous system [6]. Previous studies have reported that smoking induced significant changes in the BEP at specific acupoints on the lung meridian and at the source points of pericardium and liver meridians [7,8].

We hypothesized that smoking may affect the meridians and internal organs and that the effect of smoking on the meridians and internal organs should be reflected at 12 alarm points where the qi of internal organs and meridians gathers. To find evidence in support of this hypothesis, we enrolled 17 healthy adult smokers in this study and measured the BEP at 12 alarm points before and after filter-breathing (breathing through a filter, control session) and before and after smoking (smoking session) in a random crossover manner, after which we analyzed the changes in the BEP.

2. Methods

Twenty healthy male smokers with no underlying diseases or prescribed medicines, who had been smoking more than seven cigarettes per week for the past 6 months, were included in this study.

The criteria for exclusion were as follows: repulsion toward smoking, previous experience of any adverse event related to smoking, any withdrawal symptom after not smoking in the

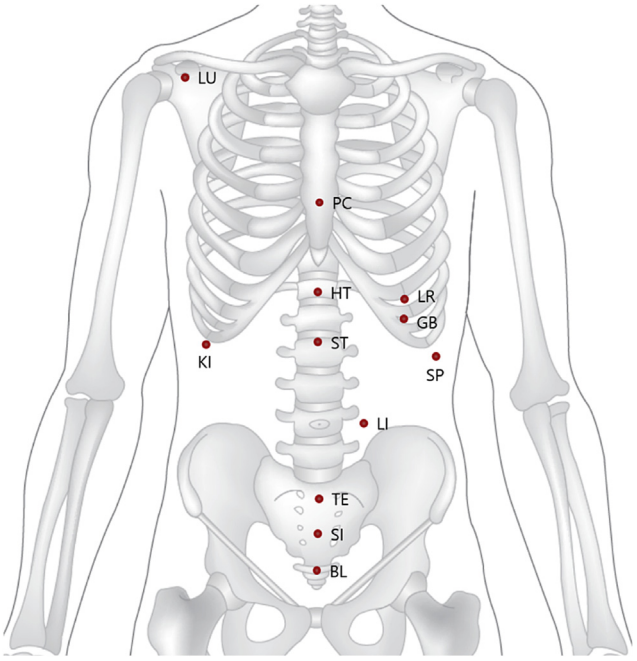

Figure 2 Locations of 12 alarm points [13]. The 12 alarm points are located in the chest and the abdomen and correspond to internal organs.
BL = alarm point of the bladder (CV3); GB = alarm point of the gall bladder (GB24); HT = alarm point of the heart (CV14); KI = alarm point of the kidney (GB25); LI = alarm point of the large intestine (ST25); LR = alarm point of the liver (LR14); LU = alarm point of the lung (LU1); PC = alarm point of the pericardium (CV17); SI = alarm point of the small intestine (CV4); SP = alarm point of the spleen (LR13); ST = alarm point of the stomach (CV12); TE = alarm point of the triple energizer (CV5).

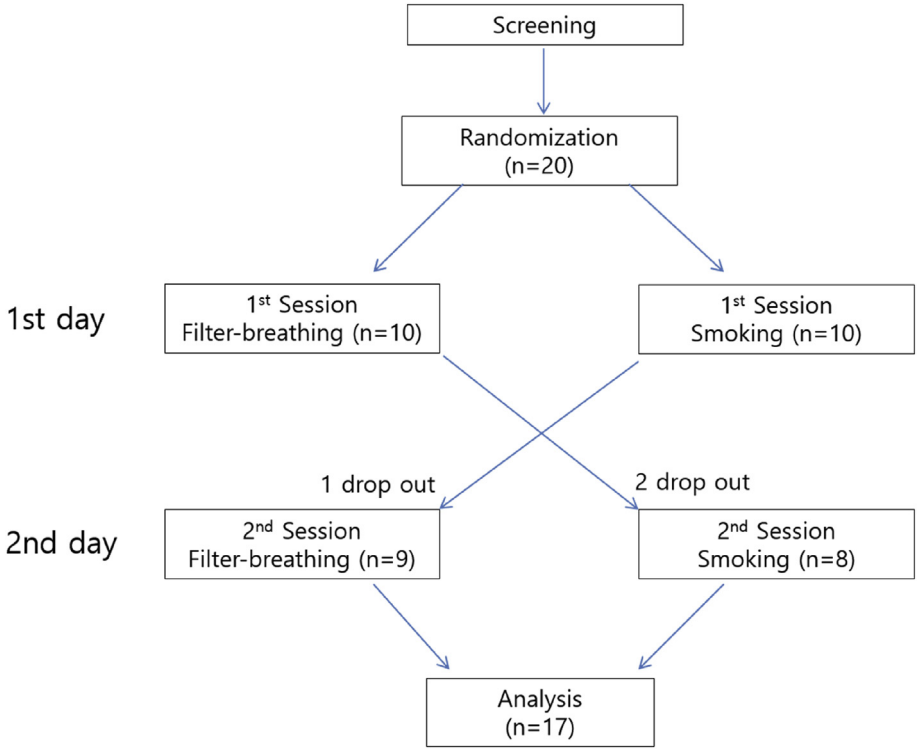

Figure 1 Crossover study.

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