

Do plants need sleep and also have emotions? – Medicinal plants, lifestyle, and herbal cultivation

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Abstract

Since a magic “polypill” – the “Environment-Sleep-Emotion-Exercise-Diet” intervention [E(e)SEEDi] was discovered in 2018, it plays a pivotal role in control and prevention of human disease due to improvement of immunity by healthy lifestyle. It can be said that it is applicable, as long as one is a human and survival. However, do plants also need the magic “polypill”? When plants need a suitable environment, rational internal exercise, and balancing nutrients (fertilizers, herbicides, nutrients, pesticides, and others), do they also need sleep? And have also emotions like humans? These are interesting questions. Currently, obvious climate change threatens herbal cultivation in both China and the globe, in particular the pandemic and post-COVID-19 era. Only when we understand and confirm that plants also need sleep and have emotions, can we better protect medicinal plants and promote herb cultivation and healthy growth, since traditional Chinese herbs have a good efficacy in combating cardiovascular disease.

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VIEWPOINT

Do plants need sleep and also have emotions?

– Medicinal plants, lifestyle, and herbal cultivation

Running title: Plants, lifestyle & HC

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Abstract

Since a magic “polypill” – the “Environment-Sleep-Emotion-Exercise-Diet” intervention [E(e)SEEDi] was discovered in 2018, it plays a pivotal role in control and prevention of human disease due to improvement of immunity by healthy lifestyle. It can be said that it is applicable, as long as one is a human and survival. However, do plants also need the magic “polypill”? When plants need a suitable environment, rational internal exercise, and balancing nutrients (fertilizers, herbicides, nutrients, pesticides, and others), do they also need sleep? And have also emotions like humans? These are interesting questions. Currently, obvious climate change threatens herbal cultivation in both China and the globe, in particular the pandemic and post-COVID-19 era. Only when we understand and confirm that plants also need sleep and have emotions, can we better protect medicinal plants and promote herb cultivation and healthy growth, since traditional Chinese herbs have a good efficacy in combating cardiovascular disease.

Keywords: climate change, emotion, herbal cultivation, medicinal plant, sleep

Although it has a long history of more than 2000 years, with the exception of acupuncture and moxibustion, there are still few clinical studies and trials of traditional Chinese medicine (TCM) or herbs treatment of cardiovascular disease (CVD) published in international top journals (Hao et al., 2017). From the past decade to now, there have finally been some breakthroughs, for example, qili qiangxin capsules and others for chronic heart failure (Li et al., 2013; Pan et al., 2023), Wenxin Keli for arrhythmia (Hua et al., 2015), Tongxinluo for cardiovascular protection in acute myocardial infarction (Xu et al., 2020), and Chinese herb medicine for hypertension (Lai et al., 2022). Moreover, the exact clinical efficacy of TCM has received wide attention in the globe, in particular the COVID-19 pandemic. In fact, TCM has been highly evaluated by World Health Organization (WHO) due to a good clinical efficacy, such as Lianhuaqingwen capsules.

Since a magic polypill – the E(e)SEEDi was discovered and finally published in *European Heart Journal* in 2018 (Hu, 2018), it plays a more and more pivotal role in the prevention and treatment of both major viral infectious diseases (mVIDs) and major non-communicable diseases (mNCDs) due to improvement of lifestyle and human immunity. As a virtual pill, it covers “the Essential 5”, that is “Environment-Sleep-Emotion-Exercise-Diet”. And it can be said that it is applicable, as long as one is a human, and as long as one is survival. However, do plants also need the E(e)SEEDi– “the magic polypill” (Figure 1)? It means that when plants need a suitable environment, a rational internal exercise, and a balancing diet (fertilizers, herbicides, nutrients, pesticides, and others), whether they also need sleep or not? And do plants also have emotions like humans? These are interesting questions. In fact, “crying crops and chattering grasses” are obvious emotional response of plants to their own environments according to recent studies (Khait et al., 2023; Veits et al., 2019; Marris, 2023), for example, “water-stressed or injured plants emitting high-pitched sounds”.



FIGURE 1 Do plants also need healthy lifestyle, the E(e)SEEDi—a virtual pill? As we already known, as a virtual pill, the magic polypill— E(e)SEEDi includes the Essential 5 “environment-sleep-emotion-exercise-diet”, and it is applicable, as long as it is human, as long as it is survival. However, whether plants also need the Essential 5 or the E(e)SEEDi? This is an interesting topic, which is worth studying, since it involves in whether plants also need sleep and have emotions as human? Beyond question, plants also need a suitable living environment and absorb nutrients like human diets. Although most of plants have no external movement or exercise excluding the power of the wind, their internal movement does not stop for a moment. Herein, only when we understand and confirm that plants also need sleep and have emotions as human, can we think that medicinal plants also need healthy E(e)SEEDi lifestyle, so that we can improve herb cultivation and growth.

As we know, current climate change (CC) has become the new normal in the 21th century. Unusual weather, such as typhoons, high temperatures or heat waves, droughts, cold or freezing temperatures, blizzards and so on, often happen unexpectedly. On the one hand, it is related to carbon emissions from industrial and agricultural production; On the other hand, it has to do with the greenhouse effect and global warming. CC not only affects economic and social development as well as sustainable growth, but also affects human health and accelerates the transmissions and infectious-disease outbreaks (such as influenza A, tuberculosis, and COVID-19) (Campbell, 2022). In addition, CC also seriously threatens biodiversity and ecological balance.

In the past decades, the two giants, the United States (US) and China, have conducted fruitful cooperation in the field of CC and achieved remarkable results. For example, international climate agreement, carbon neutrality and carbon peak, curbing emission action plan and other agreements signed. However, due to the tension in the economic and trade field, some of the relevant cooperation have been disturbed, and there is still uncertainty in the future. The author thinks that the US and China should continue maintaining a good cooperation in the field of CC to effectively address the climate crisis and challenges. As reported, “2022 will be the hottest year in the UK since the record, and the duration of this year’s extreme heat is relatively long. Besides, the temperature of every month is higher than the average temperature of the whole year except December.”

TABLE 1 The innovative theory and program of “TCM Hot Pot”. “Bark-Flower-Fruit-Grass-Leaf-Nucleolus(seed)-Root” [BFFGLNR] as a new TCM compatibility and formulation for treatment and prevention of human disease including both mVIDs and mNCDs.

“BFFGLNR”	Single Ingredient for mild and moderate conditions	Pair Ingredients for moderate and severe conditions
Barks	B1	B1 + B2
Flowers	F11	F11 + F12
Fruits	Fr1	Fr1 + Fr2
Grasses	G1	G1 + G2
Leaves	L1	L1 + L2
Nucleolus(seed)	N1	N1 + N2
Roots	R1	R1 + R2

Notes: Single, pair, three Ingredients of main candidates of traditional Chinese medicine (TCM) for mild, moderate, and severe mVIDs (such as COVID-19 and other respiratory or lung infection) and mNCDs (such as CVD, diabetes, and cancer, etc.), respectively.

In the last decade, TCM has received more and more attention and praise in the globe. Particularly in 2015, the Chinese scholar Tu Youyou won the Nobel Prize for the discovery of artemisinin (Stokstad and Vogel, 2015), and in recent years, the outstanding efficacy of TCM in fighting COVID-19 was highly praised by the World Health Organization. For example, there is an innovative theory and program of “TCM Hot Pot” (Hu, 2023), that is “Bark-Flower-Fruit-Grass-Leaf-Nucleolus(seed)-Root” [BFFGLNR] (Table 1), it is not only a significant breakthrough in the principle “Sovereign-Minister-Assistant-Courier” of TCM compatibility and formulation, but also a significant breakthrough in the clinical application of TCM for

human disease, including major virus-infectious diseases (mVIDs) and major non-communicable diseases (mNCDs), creating new theories and models for the TCM compatibility and formulation in the new era. It better reflects the holistic view and big-picture thinking of TCM syndrome differentiation and treatment, with more comprehensive medicinal ingredients, more reliable pharmacological effects, easy to learn, understand, and promote, and stronger operability.

However, planting industry in China, including the cultivation of Chinese herbal medicine, is affected to some extent due to CC related salinization, soil erosion and desertification (Tollefson, 2022). Due to inevitable direct and indirect effects on ecosystems, long-lasting effects of CC on pathogen emergence may link to the COVID-19 crisis (Schmeller et al., 2020). Moreover, the global change in climate is one of the major drivers of the emergence of zoonoses (Roberts, et al., 2021), we need better tools for evaluating infectious disease emergence and spread. In addition, since it is the new normal of both slow droughts and flash droughts, and there are more flash droughts over 74% in the globe (Yuan et al., 2023), undoubtedly, global herbal cultivation will be significantly affected.

Because there are definite population health effects from CC mitigation actions (Hess et al., 2020), related guidelines are more comparable and useful for evidence-based decision by policymakers. And since there are the strong links between risk for pandemics, human-induced climate change and biodiversity loss, innovative multidisciplinary solutions are helpful to globe health and environmental change (Destoumieux-Garzón et al., 2022), and developing innovative ways for pandemic prevention including emerging infectious diseases and zoonoses would not only reduce the risk of future pandemics but also provide a model for prevention strategies (Woolaston et al., 2022). As a public health and social investment, urban public green spaces have both social benefits (job/food creation, biodiversity promotion, carbon sequestration) and health benefits fighting against future pandemics (Geary et al., 2022).

As we all know, depression, in particular major depression (MD) is a vital public-health challenge with a multifactorial etiology, there are currently still lack of effective treatment. Since this disease can be affected by unhealthy lifestyle, such as abnormal environment, sleep, emotion, exercise, and diet, herein, improvements in psychological health by “the magic polypill” (Hu, 2018), that is the E(e)SEEDi, is a good strategy, such as Yoga. It is not clear or there is no research to show whether plants are as emotional as humans, but it is clear that medicinal plants can fight against human psychological stress and emotional abnormalities, such as anxiety and depression, and improve psychological health. In fact, plants-based polyphenols are good candidate agents for the depression due to anti-inflammatory role. Thus, to protect medicinal plants is also protection of human health.

Herein, there are several suggestions to strengthen the response to international and local climate risks and challenges. First, attach importance to the role of clean energy and green environmental protection in industrial and agricultural production; Second, accelerate the popularization and application of artificial intelligent in CC, such as automatic driving and UAV for people’s livelihood; Third, pay more attention to the efficiency of policies and laws, limit and cut emissions to the maximum extent, and formulate zero pollution standards. Fourth, since both COVID-19 infection and CC are global health threats (Negev et al., 2021), close cooperation for protection of the public health is a vital step in the globe.

In addition, because there are high links among cultivation, scarcity and price fluctuations in medicinal plants (Cunningham and Long, 2019), and the microecology highly links to the growth and development, metabolism process, and component accumulation of TCM as well as the distinctive origin and quality of Dao-di herbs (He et al., 2020), thus, the geographic information system for global medicinal plants is helpful to introduction and cultivation of TCM (such as American ginseng) in ecologically suitable areas (Shen et al., 2019).

In a word, these strategies and measures are conducive to reducing the threat of CC to the herbal cultivation and helping TCM better serve global health during the COVID-19 pandemic and post-COVID-19 era. Because water is an essential element for human survival in the world, and the human body cannot survive without water for a week. Due to the continuous high temperature and drought for a long time, plants can

not grow normally without water. Therefore, current CC is a major hazard to herb cultivation in both China and the globe. And people need to take effective strategies for fighting against CC. All in all, both humans and medicinal plants need water, in particular the “magic polypill”. And the E(e)SEEDi including water is the source of all life. A recent study (Yamada et al., 2022) found that there are equations to predict human water turnover, but not in plants. The daily water demand of plants remains a question that needs to be answered and solved by reliable experiments. Herein, only when we understand and confirm that plants also need sleep and have emotions as human, can we think that medicinal plants also need healthy E(e)SEEDi lifestyle, so that we can protect and improve herb cultivation and growth.

AUTHOR CONTRIBUTIONS

The author contributed to the conceptualization of this viewpoint. CH wrote the first draft and contributed to review, and editing.

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DATA AVAILABILITY STATEMENT

Data: No new data were collected for this study.

CONFLICTS OF INTEREST

No conflict of interest is declared.

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