

**ЛЕСОВЕДЕНИЕ, ЛЕСОВОДСТВО, ЛЕСНЫЕ КУЛЬТУРЫ, АГРОЛЕСОМЕЛИОРАЦИЯ, ОЗЕЛЕНЕНИЕ,
ЛЕСНАЯ ПИРОЛОГИЯ И ТАКСАЦИЯ / FORESTRY, FORESTRY, FOREST CROPS, AGROFORESTRY,
LANDSCAPING, FOREST PYROLOGY AND TAXATION**

DOI: <https://doi.org/10.23649/JAE.2023.36.5>

DENDRO THERAPEUTIC EFFECT OF PLANTINGS ON CITIZENS

Research article

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Abstract

The article presents the results of a study of the method of Gas Discharge Visualization (GDV). Advantages of GDV-bioelectrography – simplicity of execution, efficiency of obtaining results, can be successfully used in the study of the mechanisms of action not only in clinical practice, but also for the diagnosis and monitoring of the effectiveness of forest therapy on the human body. A walk in the woods is the best remedy for stress, many experts say. But how and why do "forest baths" affect us? And how can a city dweller feel the effectiveness of forest therapy? In recent years, forest therapy and "forest baths" have become so popular that many experts talk about walking in the forest as the most effective and safe medicine for stress. The obtained results of the studies conducted on the territory of Ufa indicate a positive dynamics of the emotional state of the recreant, stabilization of systolic, diastolic blood pressure and pulse after his stay in the park / forest park. Undoubtedly, in modern conditions, in order to restore well-being and recovery, get rid of stress and gain emotional balance, city residents need to pay attention to a safe and affordable method of recovery - forest therapy.

Keywords: forest therapy, urban plantation, Ufa.

ДЕНДРОТЕРАПЕВТИЧЕСКОЕ ЗНАЧЕНИЕ НАСАЖДЕНИЙ НА ГОРОЖАН

Научная статья

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Аннотация

В статье представлены результаты исследования метода газоразрядной визуализации (ГРВ). Преимущества ГРВ-биоэлектрографии – простота исполнения, оперативность получения результатов, могут успешно применяться при изучении механизмов действия не только в клинической практике, но и для диагностики и мониторинга на организм человека эффективности лесотерапии. Прогулка в лесу – это самое лучшее средство от стресса, говорят многие специалисты. Но как и почему «лесные ванны» влияют на нас? И как городскому жителю ощутить эффективность лесотерапии? В последние годы лесотерапия и «лесные ванны» стали настолько популярными, что многие специалисты говорят о прогулках в лесу как о самом эффективном и безопасном лекарстве от стресса. Полученные результаты проведенных исследований на территории г.Уфы говорят о положительной динамике эмоционального состояния рекреанта, стабилизации систолического, диастолического артериального давления и пульса после пребывания его в парке/лесопарке. Несомненно, в современных условиях для восстановления самочувствия и оздоровления, избавления от стресса и обретения эмоционального равновесия жителям города необходимо уделять внимание безопасному и доступному методу восстановления – лесотерапии.

Ключевые слова: дендротерапия, городские насаждения, Уфа.

Introduction

It is believed that mental health problems are one of the main causes of all diseases in the world. Kotera, Richardson, & Sheffield (2020) found that walking in the woods is effective for reducing depression, anxiety, anger and stress, and the impact on anxiety is the strongest. Future research should assess whether shorter interventions will have a beneficial effect [10] on our well-being, mental and physical. In Japan, the practice of walking through the forest has been elevated to the rank of art and has been called "shinrin-yoku" ("forest baths"). Dr. Qing Li, an associate professor at the Japanese Medical School in Tokyo and an expert in the field of forest therapy, together with colleagues conducted a series of studies that proved the healing effect of forest baths [6], [8]. Studies of the influence of the natural environment on humans are directed by the works of foreign authors and on the development of the concept of training focused on the training of forest therapists [1]. Various methods were used to measure the positive impact of the forest environment on human health. The impact of the forest environment can be measured by staying in the forest, and the negative impact on the psychological and physiological well-being of the subjects can be measured by being in an urban environment [9], [10]. In this study, the influence of plantings on the mood, recovery and vitality of Ufa residents was studied. The questionnaire was filled out by the subjects before and after the walk. The results show that time spent can be useful for reducing negative moods, such as tension, fatigue, forgetfulness, irritation, or increasing the level of recuperation.

Research methods and principles

The research was conducted in Ufa. From an ecological point of view, Ufa is classified as a complex city, since a significant concentration of harmful industries of mechanical engineering, chemistry, petrochemistry contribute to air and water pollution more than in neighboring regions of the country. The most active air pollutants in the city are industrial and agricultural enterprises, as well as numerous vehicles.

The total emission of harmful substances by 525 nature users is 339,7 thousand tons per year [12]. The assortment of urban plantings is represented by local flora and introduced plants. *Tilia cordata*, *Bétula péndula*, *Larix sukaczewii* Dylis, *Pínus sylvéstris*, *Pópulus nígra*, *Pópulus nígra var. itálica* dominate. Shrubby vegetation consists of 22 species, while 12 species grow in the southern part of the city, 15 species grow in the northern part. The age structure of trees is heterogeneous. The green area of the city is 38%. For the convenience of comparing and using information about the state of woody plants in environmental analyses when studying changes, the assessment of plantings was carried out, taking into account tax indicators using well-known methods. The assessment of the effect of forest air on humans was carried out by the method of rapid diagnostics of ultra-weak fields of natural radiation with a portable A-SCAN device. The results were processed in the "Excel" program.

Main results

Since the purpose of this study was to test how two different environments affect the emotional state of the subjects, a randomized experiment was conducted. The principle of participation in the experiment was that each participant had to be in the park or the territory of the forest area for at least half an hour. Before and after the walk, each participant underwent an express assessment of the GDV (A-SCAN device), fixing the blood pressure indicator in respondents of different ages and gender. A survey of 95 people was conducted, the age of respondents - from 12 to 65 years. The participants were also asked to assess the extent of the current emotional state and the recovery result obtained. When taking the readings of the rapid assessment of the A-SCAN device of a person's condition outside the plantings (stop-street) in adolescents of 12 years old, in some cases, the image did not appear. After a walk in the deciduous plantings, the pattern of the correct shape clearly appeared – rectilinear sections with a length of more than 10 mm, the average value was within 12 mm. Outside of plantings – in the range from 0 to 8 mm. Studies of the pattern of ultra-weak fields of natural radiation of respondents in the age range from 20 to 30 years showed an elongation of the main and additional sections by an average of 2-3 mm. The study of the influence of plantings on the finger image on people aged 30 to 40 years showed a clear manifestation of changes in the curvature of the sections and an increase in their length by an average of 5-7 mm, depending on the composition of the plantings.

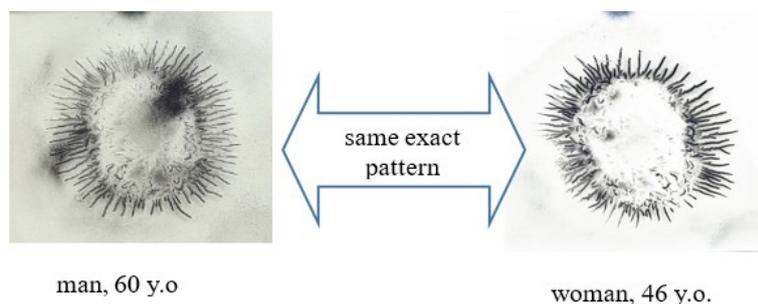


Figure 1 - An example of the image of ultra-weak fields of natural radiation of respondents in an urban environment
DOI: <https://doi.org/10.23649/JAE.2023.36.5.1>

Analysis of the obtained images of the cross-sections of ultra-weak fields of natural radiation of men and women in the age range from 40 to 60 years revealed the identity of the indicators in length, density and total area of the figure.

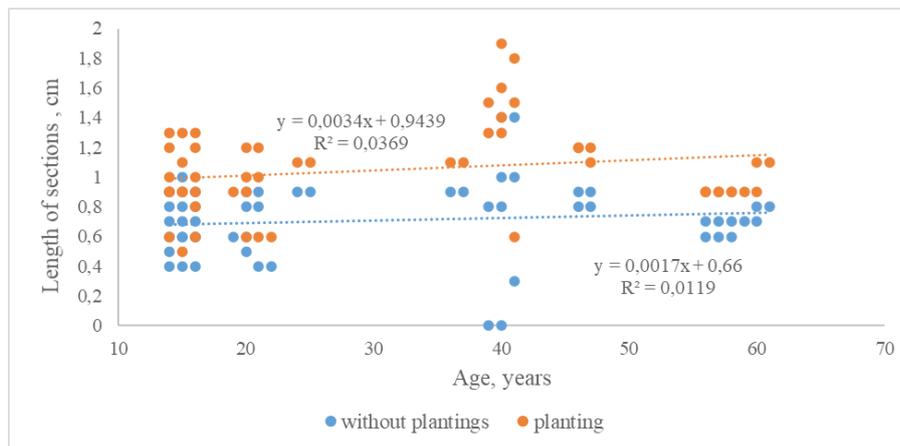


Figure 2 - The length of cross-sections over the image area of ultra-weak fields of natural radiation, depending on the location of respondents

DOI: <https://doi.org/10.23649/JAE.2023.36.5.2>

The relationship between the increase in the cross-sections of the ultra-weak fields of natural radiation of a person and his location in a green area has been established. The reliability of the approximation and the adequacy of the dependence is confirmed by the calculated values of the correlation coefficient. The binding force is direct, noticeable and corresponds to 0,670 (R), T (Student's criterion) – 2,802. The coefficient of determination R^2 is 0,313 at $y = 0,0261x + 0,8039$.

The studies conducted to identify the influence of trees on humans have clearly shown a positive result. To determine the condition of a person, pulse and arterial (systolic and diastolic) pressure were also measured using a tonometer. According to various data, normally in adults it ranges from 60–80, 60–90 beats per minute. The number of pulse beats is equal to the heart rate (HR), i.e. normally there should be no so-called pulse deficit. In addition, the pulse is normally rhythmic, symmetrical, satisfactory filling and tension [6].

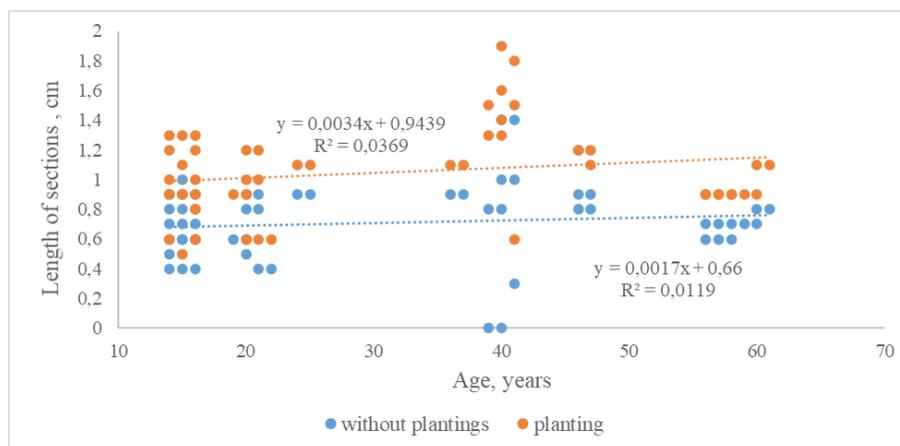


Figure 3 - Indicators of blood pressure and pulse measurements of respondents before and after a walk in the park

DOI: <https://doi.org/10.23649/JAE.2023.36.5.3>

The obtained results indicate a positive dynamics of stabilization of systolic, diastolic blood pressure and pulse after a person's stay in the park / forest park. Moreover, the studied indicators improved after a half-hour stay and did not change with an increase in pastime. When a person plunges into the atmosphere of the forest, there is a "reboot" of the nervous system, the healing mechanism is triggered in the body. Staying in the forest has a tangible effect on the human body: blood pressure stabilizes, depression goes away, a surge of energy is felt. Staying in the forest has a tangible effect on the human body: blood pressure stabilizes, depression goes away, a surge of energy is felt.

Discussion

According to the data of the World Health Organization (WHO): the health status of the population depends on socio-economic conditions and lifestyle (48-53%), genetic factors (18-20%), the level of development and quality of medical care (8-10%) and the degree of environmental pollution (17-20%) [3]. Does this mean that improving the quality of the environment, in principle, can have a 2 times greater positive impact on the health of the population than the entire activity of curative medicine...? The results of the analysis on the content and influence of a number of factors on the morbidity rate of the population of Ufa are given in the work of Gabdrakhimov K.M. and Baiturina R.R. "The Influence of Forest Cover on the Health of the Population" (2020) [2]. Currently, the GDV method has found its application in various fields of medicine [9], for example, a comparative assessment of diagnostic results obtained using the GDV method and traditional clinical and functional

methods was carried out at the Peoples' Friendship University (branch, Sochi); a large research work was carried out at the Department of Anesthesiology and Resuscitation Military Medical Academy (VMA) of St. Petersburg [7], [11], [12]. The same authors revealed a certain relationship between the altered mental status of the subjects and the indicators of GDV-grams, which was recorded graphically when displaying the area of the glow to the normalized area compared with the GDV-grams of practically healthy people [4], [5].

Conclusion

Thus, it is recommended to pay close attention to urban tree species as the main factor in improving the environment and the health of residents. In particular, this issue is vital for the elderly, children, pregnant women, citizens with a weakened immune system or predisposed to serious diseases. Green spaces, performing a sanitary and hygienic role, absorb dust and toxic gases, show a dendrotherapeutic effect on residents. They perform ecological, biological, aesthetic and health functions. With this in mind, it is necessary to bring tree plantations as close as possible to the places of everyday human life. The conducted studies are recommended for use in determining the risks to human health from significant polluting emissions of motor vehicles into the air environment and carrying out an independent assessment according to the accepted standards of concentrations of pollutants in urbanized areas. Undoubtedly, in modern conditions, in order to restore well-being and recovery, get rid of stress and gain emotional balance, city residents need to pay attention to a safe and affordable method of recovery – forest therapy. Perhaps, after some time, the doctor to whom we will come will prescribe us not pills, but communication with an oak, poplar or pine.

Финансирование

Работа выполнена в рамках государственного задания Министерства науки и высшего образования Российской Федерации «Программа создания и функционирования карбонового полигона на территории Республики Башкортостан «Евразийский карбоновый полигон» на 2022-2023 гг. (номер для публикаций: FEUR-2022-0001).

Конфликт интересов

Не указан.

Рецензия

Все статьи проходят рецензирование. Но рецензент или автор статьи предпочли не публиковать рецензию к этой статье в открытом доступе. Рецензия может быть предоставлена компетентным органам по запросу.

Funding

The work was carried out within the framework of the state task of the Ministry of Science and Higher Education of the Russian Federation "Program for the Creation and Operation of a Carbon Landfill on the Territory of the Republic of Bashkortostan "Eurasian Carbon Landfill" for 2022-2023. (publication number: FEUR-2022-0001).

Conflict of Interest

None declared.

Review

All articles are peer-reviewed. But the reviewer or the author of the article chose not to publish a review of this article in the public domain. The review can be provided to the competent authorities upon request.

Список литературы / References

1. Алексеева Е. Поход в лес за клетками-киллерами. Исследования показали, что дендротерапия значительно повышает иммунитет / Е. Алексеева // Независимая газета. — 2018 — URL: https://www.ng.ru/health/2018-06-20/8_7248_forest.html (дата обращения: 20.01.2023)
2. Gabdrakhimov K. M. The Influence of the Forest Cover of the Territory on the Health of the Population / K. M. Gabdrakhimov, R.R. Baiturina // Procedia Economics and Finance. — 2020. — 3. — p. 435-443.
3. Калинина А.А. Каким должен быть пульс у взрослого: норма и патология / А.А. Калинина // Клиника Эксперт. — 2022 — URL: <https://tver.mrtexpert.ru/articles/657> (дата обращения: 22.07.2022)
4. Коробка И.Е. Возможности метода ГРВ-биоэлектрографии в диагностике функциональной активности правого полушария мозга у больных артериальной гипертензией / И.Е. Коробка, Е.Г. Яковлева, К.Г. Коротков // Вестник новых медицинских технологий. — 2013. — 1. — с. 125-129.
5. Коротков К.Г. Применение метода ГРВ-биоэлектрографии в медицине (обзор литературы) / К.Г. Коротков, Е.Г. Яковлева // Вестник СПбГУ. — 2014. — 2. — с. 175-187.
6. Общение с деревьями: практика для 5 органов чувств // Сетевое издание Psychologies.ru. — 2023 — URL: <http://www.psychologies.ru/wellbeing/obschenie-s-derevyami-praktika-dlya-5-organov-chuvstv/> (дата обращения: 20.02.2023)
7. Polushin Yu.S. Possibilities of the Method of Gas-Discharge Visualization in Assessing Operative Stress in Patients with Abdominal Surgical Pathology / Yu.S. Polushin, E.Yu. Strukov, D.M. Shirokov, K.G. Korotkov // Bulletin of Surgery. — 2003. — 5. — p. 118.
8. Танко А. Учёные: прогулка в лесу исцеляет городских жителей от стресса и депрессии / А. Танко // www.epochtimes.com.ua. — 2022 — URL: <https://www.epochtimes.com.ua/ru/zdorovyi-obraz-zhyzni/uchyonye-progulka-v-lesu-iscelyaet-gorodskih-zhiteley-ot-stressa-i-depressii-122978> (дата обращения: 20.02.2023)
9. Baiturina R.R. Assessment of Atmospheric Air Quality in Urbanised Areas of the Southern Urals / R.R. Baiturina, R.F. Mustafin, R.R. Sultanova, K.M. Gabdrakhimov, I.G. Asylbaev // Assessment of Atmospheric Air Quality in Urbanised Areas of the Southern Urals. — 2022.
10. Kotera Y. Effects of Shinrin-Yoku (Forest Bathing) on Mental Health / Y. Kotera; — Japan: International Journal of Mental Health and Addiction, 2020.
11. Polushin J. Monitoring Energy Levels during treatment with GDV Technique / J. Polushin, A. Levshankov, D. Shirokov, K. Korotkov // J. of Science of Healing Outcome. — 2009. — 5. — p. 5-15.

12. Сайт Министерства природопользования и экологии Республики Башкортостан. — URL: <https://ecology.bashkortostan.ru> (дата обращения: 20.12.2022)

Список литературы на английском языке / References in English

1. Alekseeva E. Pohod v les za kletkami-killeraми. Issledovanija pokazali, chto dendroterapija znachitel'no povyshaet immunitet [A trip to the forest for killer cells. Studies have shown that dendrotherapy significantly improves immunity] / E. Alekseeva // Independent Newspaper. — 2018 — URL: https://www.ng.ru/health/2018-06-20/8_7248_forest.html (accessed: 20.01.2023) [in Russian]
2. Gabdrakhimov K. M. The Influence of the Forest Cover of the Territory on the Health of the Population / K. M. Gabdrakhimov, R.R. Baiturina // Procedia Economics and Finance. — 2020. — 3. — p. 435-443.
3. Kalinina A.A. Kakim dolzhen byt' pul's u vzroslogo: norma i patologija [What Should Be the Pulse of an Adult: Norm and Pathology] / A.A. Kalinina // Clinic Expert. — 2022 — URL: <https://tver.mrtexpert.ru/articles/657> (accessed: 22.07.2022) [in Russian]
4. Korobka I.E. Vozmozhnosti metoda GRV-bioelektrografii v diagnostike funktsional'noj aktivnosti pravogo polusharija mozga u bol'nyh arterial'noj gipertoniej [Possibilities of the GDV-bioelectrography Method in Diagnosing the Functional Activity of the Right Hemisphere of the Brain in Patients with Arterial Hypertension] / I.E. Korobka, E.G. Jakovleva, K.G. Korotkov // Bulletin of New Medical Technologies. — 2013. — 1. — p. 125-129. [in Russian]
5. Korotkov K.G. Primenenie metoda GRV-bioelektrografii v meditsine (obzor literatury) [Application of the Method of GDV-bioelectrography in Medicine (literature review)] / K.G. Korotkov, E.G. Jakovleva // Bulletin of St. Petersburg State University. — 2014. — 2. — p. 175-187. [in Russian]
6. Obschenie s derev'jami: praktika dlja 5 organov chuvstv [Communication with trees: a practice for the 5 senses] // Online publication Psychologies.ru. — 2023 — URL: <http://www.psychologies.ru/wellbeing/obschenie-s-derevyami-praktika-dlya-5-organov-chuvstv/> (accessed: 20.02.2023) [in Russian]
7. Polushin Yu.S. Possibilities of the Method of Gas-Discharge Visualization in Assessing Operative Stress in Patients with Abdominal Surgical Pathology / Yu.S. Polushin, E.Yu. Strukov, D.M. Shirokov, K.G. Korotkov // Bulletin of Surgery. — 2003. — 5. — p. 118.
8. Tanko A. Uchenye: progulka v lesu istseljaet gorodskih zhitelej ot stressa i depressii [Scientists: a walk in the forest heals urban residents from stress and depression] / A. Tanko // The Epoch Times. — 2022 — URL: <https://www.epochtimes.com.ua/ru/zdorovyi-obraz-zhizni/uchyonye-progulka-v-lesu-iscelyaet-gorodskih-zhiteley-ot-stressa-i-depressii-122978> (accessed: 20.02.2023) [in Russian]
9. Baiturina R.R. Assessment of Atmospheric Air Quality in Urbanised Areas of the Southern Urals / R.R. Baiturina, R.F. Mustafin, R.R. Sultanova, K.M. Gabdrakhimov, I.G. Asylbaev // Assessment of Atmospheric Air Quality in Urbanised Areas of the Southern Urals. — 2022.
10. Kotera Y.. Effects of Shinrin-Yoku (Forest Bathing) on Mental Health / Y. Kotera; — Japan: International Journal of Mental Health and Addiction, 2020.
11. Polushin J. Monitoring Energy Levels during treatment with GDV Technique / J. Polushin, A. Levshankov, D. Shirokov, K. Korotkov // J. of Science of Healing Outcome. — 2009. — 5. — p. 5-15.
12. Sajt Ministerstva prirodnopol'zovaniya i ekologii Respubliki Bashkortostan [Website of the Ministry of Nature Management and Ecology of the Republic of Bashkortostan]. — URL: <https://ecology.bashkortostan.ru> (accessed: 20.12.2022)