

Original Research Article

The influence of geographical origin of medical students on their opinions about the value of medicinal plants in cancer treatment

Jenish Lakhabhai Vekariya^{1*}, V. P. Vdovichenko²

¹Department of Pharmacology, Grodno State Medical University, Grodno, Belarus

²Department of Pharmacology, Candidate of Medical Sciences, Grodno State Medical University, Grodno, Belarus

Received: 15 March 2026

Revised: 20 April 2026

Accepted: 21 May 2026

*Correspondence:

Dr. Jenish Lakhabhai Vekariya,

E-mail: jenishvekariya598@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: During medical study in university students should learn about both traditional-based medicine and evidence-based medicine in order to tackle different clinical aspects of practice. This study aimed to get to know about medical students' understanding about usage of different types of plants based medicine in treatment of various forms of cancer.

Methods: Using an online survey "Google forms" information was collected among Grodno State Medical University (GrSMU) 100 medical students from Asian origin (India and Sri Lanka) and 100 Belarusian medical students participated.

Results: Students from Asian origin (India) found out to be more deeply related to traditional-based medicine while students from Belarus were less likely to trust this form of medicine.

Conclusions: In conclusion, we've found out that heterogeneity of knowledge about plant-based medicine in the cure of oncological diseases between medical students of different regions. Medical students from Asia (especially from India) are more engaged with the use of plants-based medicine for treatment of oncological disease.

Keywords: Cancer treatment, Questionnaire, Medical students, Plant medicine

INTRODUCTION

During studying in medical university students learn about evidence-based medicine. As well as evidence-based medicine if students have knowledge about plant-based treatment options that can shape a really good physician. Evidence based medicine (EBM) uses scientific evidence from research that is combined with clinical expertise. Medical students' insights matter as to what they'll choose for treatment in future. Treatment with plant-based medicine is increasing in medical treatment guidelines and as well as in WHO strategy on traditional and complementary medicine.¹ Some studies concluded that medical students' usage among complementary and alternative medicine were positive but their knowledge

about complementary and alternative medicine were low.^{2,3} This research basically provides detailed information about medical students' insights among Asian medical students and Belarusian medical students and provides detailed comparison on usage of plant-based medicine in these 2 different regions. Furthermore, this study also provides some scientific data about plants effects or derivatives of plants effects in treating cancer.

METHODS

Study design

It is a cross-sectional study that was done using an online survey "Google forms", 100 medical students from Asian

origin (India and Sri Lanka) and 100 medical students from Belarus participated.

Study setting and period of study

This study was done on medical students of Grodno State Medical University (GrSMU), on the period between November 2025 to December 2025.

Inclusion criteria

Medical students, must have passed pharmacology, students were selected from specific regions (Asia and Belarus) to compare better and to get proper results.

Exclusion criteria

Non-medical student, students failed in pharmacology subject, region except Asia and Belarus were excluded.

Procedure

Students were selected randomly first, all inclusion criteria (must be medical student, must have completed pharmacology subject in study and regions were strictly followed) were determined,

From 2nd year to 6th year of medical students 20-20 students from each year were taken to get clear results, after that online “Google Form” was sent to students and their consent and email were collected. In the “Google Form” we formatted questions for research. Using this online survey, we got information about medical students' knowledge about medicinal plants that are used in cancer treatment. Students were notified about research and their permission was taken in order to enroll them in research.

Ethical approval from university wasn't required. University and students both were notified about research and both approved this low risk study in an aspect of research that only took the general geographical and knowledge based information in terms of plants based medicine in cancer treatment.

Statistical analysis

Statistical analysis data were recorded through data collection and numbers. After that numbers were converted into percentages and presented on tables. Confidentially was strictly maintained.

RESULTS

Figure 1 shows a graphical presentation of our study of 200 medical students, 100 male and 100 female included in the age range between 21-25.

As described in Table 1, total 100 medical students from each regions and participated and a little more than half of medical students from Asia origin (India and Sri Lanka)

55% were fully aware about the usage of traditional based medicine used in different types of oncological diseases. With comparison of Belarusian medical students, the majority of 61% of Belarusian medical students were not aware about the treatment of oncological diseases with the help of plant-based traditional medicine. This shows the opposite attitude of knowledge about traditional based medicine knowledge between 2 different regions.

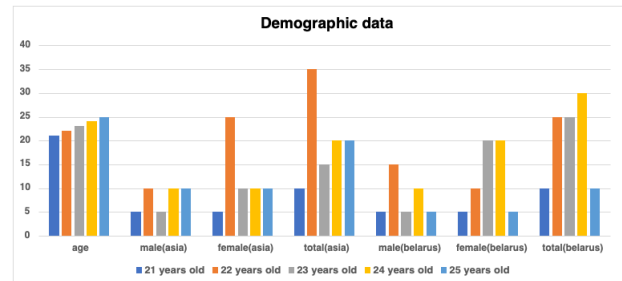


Figure 1: Demographic data of medical students included in this study.

Table 1: Geographical data of medical students.

Medical students	From Asia (n=100), %	From Belarus (n=100), %
2 nd year	20 (n=20)	20 (n=20)
3 rd year	20 (n=20)	20 (n=20)
4 th year	20 (n=20)	20 (n=20)
5 th year	20 (n=20)	20 (n=20)
6 th year	20 (n=20)	20 (n=20)

On the other hand, 40% of medical students were shown related knowledge partially and with comparison of Belarusian medical knowledge it was opposite that only 16% of students were completely aware about this form of medicine usage in oncological diseases and the rest of 23% of students were partially informed.

More than 60% of Asian origin students believed that plant-based medicine is effective for the cure of cancer and the remaining students believed the possibility of treating cancer by plant-based medicine without complete curation (50-50%). On the other hand, only 4% of Belarusian medical students believe in the effectiveness of plant-based medicine for the cure of cancer (Table 2).

The majority of Indian students (80%) got this type of information from their parents and through internet sources (social media, google). If we compare these with Belarusian medical students (45%) they got most of the information from the internet and social media platforms and from some reading.

Majority of Indian students and their parents 60% have already used plant-based medicine to improve their quality of life. With comparison of Belarusian students it is only 15% and it is a very opposite situation regarding the usage of plants and plant-based medicine.

In the questionnaire students were allowed to list the medicinal plants that are widely used in their respective countries and they know it. The percentages of students noted in list of the plant names and indicated Table 5.

Table 2: Percentage of students from different regions and their attitude towards usage of traditional based medicine in treatment of oncological diseases.

Usage of traditional based medicine in treatment of cancer	Asian origin (India and Sri Lanka) medical students (n=100), %	Belarus origin medical students (n=100), %
Fully aware	55 (n=55)	16 (n=16)
Partially aware	40 (n=40)	23 (n=23)
Not sure	5 (n=5)	61 (n=61)

Table 3: Shows attitude of medical students about effectiveness of plant-based medicine in cure of cancer.

Effectiveness of plant-based medicine in cure of cancer	Asian origin (India and Sri Lanka) medical students (n=100), %	Belarus origin medical students (n=100), %
100% believes	60 (n=60)	4 (n=4)
50-50% believes	40 (n=40)	96 (n=96)

Table 4: Shows what was the main source of information about medicinal plants.

Source of information	Asian origin (India and Sri Lanka) medical students (n=100), %	Belarus origin medical students (n=100), %
Internet	15 (n=15)	45 (n=45)
Family	80 (n=80)	5 (n=5)
Other	5 (n=5)	50 (n=50)

Asian origin (India and Sri Lanka) students listed the following plant-based remedies names: Mayapple (*Podophyllum peltatum*) (67%), Turmeric (curcumin compound) (65%), Green tea (EGCG) (55%), Tulsi (55%), Neem (55%), Ashwagandha (52%), *Bacopa monnieri* (48%), *Carica papaya* (Papaya) (42%), *Ocimum sanctum* (42%), *Allium sativum* (36%), Aloe vera (30%), Ginger (25%), *Cannabis sativa* (12%). These are all listed names above that belong to traditional (folk) medicine.

Among Belarusian students (35%) surveyed the following remedies: Propolis (20%), Chaga mushroom or *Inonotus obliquus* (14%), Onion (13%), Amanita mushrooms (12%), Lesser periwinkle herb or *Vinca minor* (11%), potato tops (7%). Propolis is a resinous mixture that honey bees produce by mixing saliva, beeswax and botanical sources (tree buds, sap flows). All of the plants listed above belong to traditional-based medicine.

Table 5: Listed plant-based remedies names by medical students of different regions.

List of plants named by Asian origin (India and Sri Lanka) medical students (n=100) (%)	List of plant named by Belarus origin medical students (n=100) (%)
Mayapple (<i>Podophyllum peltatum</i>) (67)	Propolis (20)
Turmeric (curcumin compound) (65)	Chaga mushroom (14)
Green tea (EGCG) (55)	<i>Inonotus obliquus</i> (14)
Tulsi (55)	Onion (13)
Neem (55)	Amanita mushrooms (12)
Ashwagandha (52)	Lesser periwinkle herb (11)
<i>Bacopa monnieri</i> (48)	<i>Vinca minor</i> (11)
<i>Carica papaya</i> (Papaya) (42)	potato tops (7)
<i>Ocimum sanctum</i> (42)	
<i>Allium sativum</i> (36)	
Aloe vera (30)	
Ginger (25)	
<i>Cannabis sativa</i> (12)	

Note: each student was allowed to name multiple names therefore students have named multiple names

DISCUSSION

From Himalayan mayapple (*Podophyllum peltatum*) an important compound is derived podophyllotoxin from anticancer drugs (etoposide and teniposide) that is used in treatment of various types of cancer. Himalayan mayapple also showed antioxidant, anticarcinogenic, antimetabolic and immunomodulatory effects shown in different studies.^{4,5}

Curcumin compound (turmeric) is one of the major effective plant derived compounds that showed very effective anticancer properties. Curcumin longa has shown its effectiveness in various types of cancer (breast cancer, lung cancer, hematological cancer and gastric cancer). Through molecular mechanisms by its ability to target different molecular cell signaling pathways like cell growth, cytokine and transcription factors.^{6,7}

About cannabinoid sativa, each *C. sativa* strain contains many phytocannabinoids and flavonoids and among them phytocannabinoids have anti-cancer properties in vivo and vitro. Phytocannabinoids act via inhibiting cell proliferation, migration and also by inducing apoptosis. *C. sativa* compound phytocannabinoids with its molecular mechanism like altering cannabinoid receptor type 1 and 2 (CB1 and CB2) can inhibit invasiveness of various cancers including skin and breast cancer.⁸ In melanoma cancer cells *C. sativa* has shown its apoptotic properties against cancer cells.⁹

Nowadays green tea is the main and most effective beverage for cancer prevention. Some studies have shown the effectiveness of green tea in prevention of recurrence

of colorectal polyps.¹⁰ Green tea (EGCG) contains compound polyphenols that are considered as preventive effects of cancer as well as reducible effects of various pathologies. Green tea polyphenols (EGCG) can reduce expression of molecular compounds like cyclin D1 and can increase expression of p53(tumor suppressor gene).¹¹

Neem (*Azadirachta indica*) is also called “a wonder tree” because of its various properties. It contains more than 50 types of biological compounds including steroids that are purified from this plant. Neem (*Azadirachta indica*) contain numerous properties and mechanisms against cancer. Among anti-cancer properties are immunomodulatory, tumor suppressive and apoptotic properties as well included. It is a native plant found in Asian countries like India and Sri Lanka.¹²

Neem have anti-carcinogen and anti-mutagenic properties. Neem can arrest tumor growth and proliferation via molecular mechanisms and can arrest tumor growth. In many studies neem and its compound showed greater effectiveness against tumors by inducing apoptosis and promoting autophagy.^{12,13}

Tulsi (*Ocimum sanctum*) is the most commonly used plant in traditional medicine. In fact, it's been used since ancient times. It has multiple effects such as anti-cancer, anti-inflammatory, anti-diabetic, anti-microbial and hepatoprotective properties as well. Other properties include immunomodulatory, cardioprotective and antioxidant effects.^{14,15}

About anti-cancer effects of Tulsi (*Ocimum sanctum*); a component of Tulsi (*Ocimum sanctum*) Vicenin-2 has shown its effect on human colon cancer cells by arresting cell growth.¹⁴ One of the important components is eugenol. Eugenol is a powerful component of Tulsi (*Ocimum sanctum*) and it has multiple positive anti-cancer effects on different types of cancer. For example, it induces apoptosis in breast cancer, leukemia and lung cancer.¹⁵

Garlic (*Allium sativum*) also contains numerous anti-cancer mechanisms and antioxidant action. Studies show that Garlic (*Allium sativum*) through its component inhibits cell proliferation and induces apoptosis and that is a very important and crucial step for restricting growth of cancer. Among its antioxidant effects Garlic (*Allium sativum*) is itself an antioxidant and has greater effects.^{16,17}

Ashwagandha (*Withania somnifera*) has shown its effect against hepatocellular carcinoma. Studies show that Ashwagandha water extract is very powerful and a good antioxidant and it can also restrict cell growth. It has shown its positive anti-cancer effects against numerous cancers like breast, colon, ovarian, lung and hepatocellular carcinoma.^{18,19}

The Brahmi (*Bacopa monnieri*) plant is famous for its immunomodulatory effects. The brahmi is recognized for its anti-cancer and anti-inflammatory effects by enhancing

maturation and function of dendritic cells and also it stimulates pro-inflammatory cytokines as well.²⁰ In oral cancer cells it also showed its anti-cancer effects by apoptosis of cancer cells.²¹

Ginger (*Zingiber officinale*) is used in tea and vegetables for a long time. About its anti-cancer properties some studies show that it can induce apoptosis of human colorectal cancer cells and can reduce their viability.²²

Belarusian students also named some traditional-based remedies; Lesser periwinkle herb (vinca minor) is found to be containing many types of alkaloids and some of them have hypoglycemic and cytotoxic effects and some alkaloids is used in diabetes and high blood pressure but uses of them in oncological diseases is less shown.²³

About amantia mushrooms some studies believe that it can be used in treatment of cancer but there is lack of evidence that proves the effectiveness of amantia mushrooms in cancer treatment.²⁴

One of them is propolis that contains many biological substances and according to some studies, it can inhibit proliferation as well as angiogenesis and tumor metastasis but the practical significance of this data is not approved experimentally.²⁵ Therefore, the use of propolis for treatment of cancer has not been proved yet.^{26,27}

Chaga mushrooms is traditional-based medicine and in some literature is believed to be used as symptomatic therapy in the last stage of cancer because of its cytotoxic effects, but at the same time some studies indicate that the anti-tumor properties of chaga mushrooms are rare.²⁸

We can see there is difference between Asian students and Belarusian students at every stages, while selecting traditional-based medicine, while believing the effects of traditional-based medicine in disease, in term of attitude of students toward this (traditional-based) form of medicine and this all things shows very heterogeneity of attitude between 2 different nationalities. The listed remedies between 2 different groups also did not match and effectiveness and the number of remedies named by Belarusian students is limited while on the other hand Asian students named so many remedies.

With these scientific results and studies it is determined that traditional based medicine has a lot of potential to be used as anti-cancer therapies. A lot of research of plant components is still going on and it is very good to have the idea to include them in oncological therapies because of lesser side effects and greater effects. It has very much potential and with use of derivatives of medicinal plants treatment of many diseases (including oncological) could be possible.

This study has few limitations. The number of medical students that participated in the questionnaire were limited. From Asia only Indian and Sri-Lankan medical students

took part in the questionnaire. Because of these reasons we are not able to find the exact percentage and exact value of medical students' knowledge in terms of oncology disease treatment using medical plants.

CONCLUSION

In conclusion, we've found out that medical students from India are more engaged with the use of plants based medicine for treatment of oncological disease and use of plants for a healthy lifestyle. Because of their traditional family use of plants based treatment they tend to know more about medicinal plants usage compared to other countries where usage of traditional (folk) medicine is limited. The lists of plants mentioned by students in the two research groups do not match. This indicates that knowledge of plants used in traditional medicine for cancer treatment is strictly limited geographically. The lack of compelling evidence that meets the criteria of evidence-based medicine hinders interest in in-depth scientific study of these herbal remedies, as well as the sale of products made from them in other regions of the world.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

REFERENCES

- Krenn L, Burkart M. The attitude of medical students concerning herbal medicinal products/phytopharmaceuticals/phytotherapy in different regions of Europe. *Phytomed Plus*. 2024;4(2):100525.
- Brown S, Bilszta JLC. Medical students use, attitudes towards, and knowledge of complementary and alternative medicine: A scoping review. *Asia Pac Sch*. 2021;6(4):107-117.
- Loh KP, Ghorab H, Clarke E, Conroy R, Barlow J. Medical students' knowledge, perceptions, and interest in complementary and alternative medicine. *J Altern Complement Med*. 2013;19(4):360-6.
- Rajesh Arora RA, Shikha Singh SS, Puri SC, Sharma RK. Himalayan mayapple: traditional uses, clinical indications and future prospects. In: Watson RR, Preedy VR, eds. *Botanical Medicine in Clinical Practice*. 1st ed. CAB International; 2008:71-84.
- Singh N, Agrawal P. A comprehensive review on the pharmacognostic and toxicological profile of *Podophyllum peltatum* (Bajiaolian). *Pharmacol Res - Mod Chin Med*. 2024;10:100353.
- Giordano A, Tommonaro G. Curcumin and Cancer. *Nutrients*. 2019;11(10):2376.
- Zoi V, Galani V, Lianos GD, Voulgaris S, Kyritsis AP, Alexiou GA. The Role of Curcumin in Cancer Treatment. *Biomedicines*. 2021;9(9):1086.
- Koltai H, Shalev N. Anti-Cancer Activity of Cannabis sativa Phytocannabinoids: Molecular Mechanisms and Potential in the Fight against Ovarian Cancer and Stem Cells. *Cancers*. 2022;14(17):4299.
- Mukosi M, Motadi LR. Cannabis sativa a potential anticancer treatment in melanoma cancer cells. *Nat Prod Commun*. 2023;18(9):1934578X231176680.
- Suganuma M, Saha A, Fujiki H. New cancer treatment strategy using combination of green tea catechins and anticancer drugs. *Cancer Sci*. 2011;102(2):317-23.
- Chen D, Wan SB, Yang H, Yuan J, Chan TH, Dou QP. EGCG, green tea polyphenols and their synthetic analogs and prodrugs for human cancer prevention and treatment. *Advan Clin Chem*. 2011;53:155.
- Paul R, Prasad M, Sah NK. Anticancer biology of *Azadirachta indica* L (neem): A mini review. *Cancer Biol Ther*. 2011;12(6):467-76.
- Agrawal S, Bablani Popli D, Sircar K, Chowdhry A. A review of the anticancer activity of *Azadirachta indica* (Neem) in oral cancer. *J Oral Biol Craniofacial Res*. 2020;10(2):206-9.
- Almatroodi SA, Alsahli MA, Almatroudi A, Rahmani AH. *Ocimum sanctum*: role in diseases management through modulating various biological activity. *Pharmacogn J*. 2020;12(5):1198-1205.
- Hasan MR, Alotaibi BS, Althafar ZM, Mujammmi AH, Jameela J. An Update on the Therapeutic Anticancer Potential of *Ocimum sanctum* L.: "Elixir of Life." *Molecules*. 2023;28(3):1193.
- Özkan İ, Koçak P, Yıldırım M, Ünsal N, Yılmaz H, Telci D, et al. Garlic (*Allium sativum*)-derived SEVs inhibit cancer cell proliferation and induce caspase mediated apoptosis. *Sci Rep*. 2021;11(1):14773.
- Capasso A. Antioxidant action and therapeutic efficacy of *Allium sativum* L. *molecules*. 2013;18(1):690-700.
- Ahmed W, Mofed D, Zekri AR, El-Sayed N, Rahouma M, Sabet S. Antioxidant activity and apoptotic induction as mechanisms of action of *Withania somnifera* (Ashwagandha) against a hepatocellular carcinoma cell line. *J Int Med Res*. 2018;46(4):1358-69.
- Dutta R, Khalil R, Green R, Mohapatra SS, Mohapatra S. *Withania Somnifera* (Ashwagandha) and Withaferin A: Potential in Integrative Oncology. *Int J Mol Sci*. 2019;20(21):5310.
- Kumar RI, Jain K, Arora P, Gururajan H, Rai KR, Mukherjee O, et al. Brahmi (*Bacopa monnieri*) plant preparation facilitates to enhance the activities of dendritic cells to control non-small cell lung cancer (NSCLC). *J Cancer Res Clin Oncol*. 2025;152(1):18.
- Mishra SR, Behera BP, Singh VK, Mahapatra KK, Mundkinajeddu D, Bhat D, et al. Anticancer activity of *Bacopa monnieri* through apoptosis induction and mitophagy-dependent NLRP3 inflammasome inhibition in oral squamous cell carcinoma. *Phytomedicine*. 2024;123:155157.
- Park GH, Park JH, Song HM, Eo HJ, Kim MK, Lee JW, Lee MH, et al. Anti-cancer activity of Ginger (*Zingiber officinale*) leaf through the expression of activating transcription factor 3 in human colorectal cancer cells. *BMC Complement Altern Med*. 2014;14(1):408.

23. Moudi M, Go R, Yien CYS, Nazre M. Vinca alkaloids. *Int J Prev Med.* 2013;4(11):1231-1235.
24. Ernst E. A systematic review of systematic reviews of homeopathy. *Br J Clin Pharmacol.* 2002;54(6):577-82.
25. Forma E, Brys M. Anticancer activity of propolis and its compounds. *Nutrients.* 2021;13(8):2594.
26. Khalil ML. Biological activity of bee propolis in health and disease. *Asian Pac J Cancer Prev APJCP.* 2006;7(1):22-31.
27. Marucci L, Farneti A, Di Ridolfi P, Pinnaro P, Pellini R, Giannarelli D, et al. Double-blind randomized phase III study comparing a mixture of natural agents versus placebo in the prevention of acute mucositis during chemoradiotherapy for head and neck cancer: Natural agents to prevent acute mucositis during chemoradiotherapy. *Head Neck.* 2017;39(9):1761-9.
28. Abugomaa A, Elbadawy M, Ishihara Y, Yamamoto H, Kaneda M, Yamawaki H, et al. Anti-cancer activity of Chaga mushroom (*Inonotus obliquus*) against dog bladder cancer organoids. *Front Pharmacol.* 2023 Apr 19;14:1159516.

Cite this article as: Vekariya JL, Vdovichenko VP. The influence of geographical origin of medical students on their opinions about the value of medicinal plants in cancer treatment. *Int J Res Med Sci* 2026;14:2794-9.