Tea_anxiety_disorder_medical_students.pdf

by

Submission date: 03-Mar-2023 07:39PM (UTC+0700)
Submission ID: 2027906564
File name: Tea_anxiety_disorder_medical_students.pdf (395.05K)
Word count: 5125
Character count: 26063

Clinical Epidemiology and Global Health 17 (2022) 101114

Contents lists available at ScienceDirect

Clinical Epidemiology and Global Health

journal homepage: www.elsevier.com/locate/cegh

The effect of *Camellia sinensis* tea on a decreased risk of anxiety for medical students at Universitas Lambung Mangkurat Indonesia

Mohammad Bakhriansyah [a,*], Sidnan Naufa Sulaiman [b], Rahmi Fauzia [c]

[a] Department of Pharmacology, School of Medicine, Medical Faculty, Universitas Lambung Mangkurat, Banjarmasin, Indonesia
[b] School of Medicine, Medical Faculty, Universitas Lambung Mangkurat, Banjarmasin, Indonesia
[c] Department of Clinical Psychology, School of Psychology, Medical Faculty, Universitas Lambung Mangkurat, Banjarbaru, Indonesia

ARTICLE INFO

Keywords:
Anxiety
Camellia sinensis
Tea
Students
Medical faculty

ABSTRACT

Background: Anxiety is a response for inability to overcome problems that commonly occurs in medical students, thus affecting their academic performances. The content of L-theanine in *Camellia sinensis* (*C. sinensis*) tea is able to cause a relaxing effect to reduce anxiety.
Objectives: The purpose of this study was to determine the effect of *Camellia sinensis* (*C. sinensis*) tea consumption on anxiety level in medical students.
Method: This was an analytic observational with cross-sectional approach within 332 undergraduate students at Medical Faculty ULM in December 2021. They were selected using simple random sampling technique. Data were collected online via Google form. A questionnaire and The Zung Self-rating Anxiety Scale were applied to figure out characteristics of respondents including tea consumption status, and to determine the anxiety status, respectively. Data were then analyzed using a multinomial logistic regression test.
Results: This study demonstrated that consuming tea occasionally (≥1 glass per week) showed a lower risk of mild-moderate anxiety by 9% (adj. OR 0.91, 95%CI: 0.47-1.77) and of marked-severe anxiety by 46% (adj. OR 0.55, 95%CI: 0.12-2.43) compared to non-tea drinkers. Meanwhile, consuming 1 glass and 2–3 glasses of tea per day showed a 20% (adj. OR 0.80, 95%CI: 0.36-1.79) and a 54% (adj. OR 0.46, 95%CI: 0.15-1.37) lower risk of mild-moderate anxiety, respectively compared to non-tea drinkers. However, this association was not statistically significant ($p>0.05$).
Conclusions: These results indicate that there is a tendency of a decreased risk of anxiety for the increased consumption of *C. sinensis* tea.

1. Introduction

About 284 million of people suffered from anxiety around the globe in 2017. It contributes to 3.8% of total population in which 2.8% and 4.7% affecting men and women, respectively.[1] According to a survey conducted in Indonesia, in 2018 6% of about 14 million population above 15 years old experienced anxiety disorder.[2] A study performed in the Medical Faculty Universitas Udayana, Bali, Indonesia demonstrated that 76.9% and 23.1% of medical students had moderate and mild anxiety disorders, respectively. Another study conducted in a Medical Faculty in Bandung, Indonesia also showed that 60% of medical students had anxiety disorders, consisting of mild anxiety by 34%, moderate anxiety by 20%, severe anxiety by 4%, and extreme anxiety by 2%.[3]

Anxiety disorders among undergraduate medical students are higher than their counterparts from any other faculties. They experience physical and mental pressure due to strict academic agenda in campus, a high demand of off-campus independent learning, and also extra curricula activities. These pressures are able to weaken their memory, distract their focus, and disrupt their information processes. Ultimately, these pressures might influence their academic performance.[3,4]

One modality to pharmacologically treat anxiety disorders is using antianxiety medications. However, these drugs are able to suppress the central nervous system that might lead to physical and/or psychological dependency. Thus, these drugs are not recommended for a chronic use. On the other hand, since anxiety disorders require a long-term therapy, non-pharmacological therapy is needed as an alternative and/or a

* Corresponding author. School of Medicine, Medical Faculty, Universitas Lambung Mangkurat, Jalan Veteran Sungai Bilu No 128, Melayu, Kecamatan Banjarmasin Tengah, Kota Banjarmasin, Kalimantan Selatan, 70122, Indonesia.
E-mail address: mbakhriansyah@ulm.ac.id (M. Bakhriansyah).

https://doi.org/10.1016/j.cegh.2022.101114
Received 14 February 2022; Received in revised form 15 July 2022; Accepted 21 July 2022
Available online 31 July 2022

complimentary treatment.[4,5]

Camellia sinensis (*C. sinensis*) is one of plans consumed as tea around the world including in Indonesia. Tea is not only for a drink, but the community in Indonesia also uses it for medication.[6,7] *Gamma-etylamino-L-glutamic acid* (L-theanine), an active ingredient in the tea is reported to have a relaxation effect. Hence tea is able to use to treat anxiety, stress, and depression.[8] A study proved that L-theanine in *Matricaria recutita* (camomile) tea has antianxiety effect for humans. Some studies on a short-term use of L-theanine in *C. sinensis* tea have also demonstrated its effect as antianxiety and antistress for either animal and humans. However, to the best of our knowledge, these such association studies have not been performed among medical students.[9] Hence, the aim of this study was to find out the effect of *C. sinensis* tea consumption on a decreased risk of anxiety for medical students at Universitas Lambung Mangkurat, Banjarmasin-Banjarbaru, Indonesia.

2. Materials and methods

2.1. Study design and participants

It was an observational cross-sectional study. Due to the global Covid-19 pandemic, data were collected by using online questionnaires among undergraduate students at the Medical Faculty, Universitas Lambung Mangkurat, Indonesia in December 2021. This faculty is located in two regencies, i.e., Banjarmasin and Banjarbaru in South Borneo province. Four schools were involved in this study, namely School of Medicine (SoM), School of Nursing (SoN), School of Public Health (SoPH), and School of Psychology (SoP). In odd semester 2021/2022, 1715 students have registered in these undergraduate programmes. Of them, 323 students were recruited as respondents for this study by simple random sampling technique. Sample size was calculated by applying The Slovin formulae. Written informed consent was obtained from all respondents. Their right to autonomy, confidentiality, and withdrawn from the study was respected. Their participation was voluntarily. The Health Research Ethic Committee of the Medical Faculty, Universitas Lambung Mangkurat, Banjarmasin, Indonesia has approved this study protocol under number No. 958/KEPK-FK ULM/EC/XII/2021 issued on December 17th, 2021.

2.2. Research variables

Two questionnaires were distributed to respondents by using the Google Form. The first one identified a status of their tea consumption within a last week prior to the study. We allowed many variances of *C. sinensis* tea, i.e., green tea, black tea, red tea, and white tea for this study. These variances are the most common tea consumed as a beverage in Indonesia. An open-ended question was also provided for respondents to write down the tea brand if they did not know its species. If so, we then identified them based on the main ingredient of the tea from the label as either *C. sinensis* tea or not. Tea consumption status was then categorized based on how frequent our respondents consumed the tea, i.e., "seldom" (not every day), "1 glass per day", "2–3 glasses per day", and "≥4 glasses per day" within the last week prior to the study. Respondents who were not drinking tea within the last week were defined as non-tea drinkers. In this questionnaire, we also sought for information about baseline characteristics of the respondents that have been well known to be associated with tea consumption and the anxiety, including their demographic data. These variables were age, sex, sleep quality, length of study, origin of school, origin of province, status of residence, a personal history of anxiety, a familial history of anxiety, and drug use associated with anxiety.

The second questionnaire, the Zung Self-Rating Anxiety Scale (ZSAS) was used to determine anxiety level. It consists of 20 items with 5 questions and 15 questions assessing affective aspects and somatic symptoms of anxiety, respectively. Each question was scored on a Likert-type scale of 1–4 based on these replies, i.e., "a little of time", "some of the time", "good part of the time", and "the most of the time", respectively. The total score was then calculated. This score links to an anxiety index, i.e., 20–44 as a normal range, 45–59 as a mild to moderate anxiety level, 60–74 as a marked to severe anxiety level, and ≥75 as an extreme anxiety level.[10]

2.3. Data analyses

Characteristics and demographic data of respondents in different levels of anxiety were compared using an ANOVA test and a chi-square test for continuous variables and categorical variables, respectively. A multinomial logistic regression test was then applied to estimate crude odds ratios (ORs), adjusted ORs and 95% confidence intervals (95% CIs) of the risk of anxiety associated with tea consumptions. We adjusted ORs for all listed potential confounders above. Different categories of tea consumption were compared to non-tea drinkers as a reference group. We found actual number of ≤5 for some categories of tea consumption in different level of anxiety, these categories were then not analyzed. All the analyses were carried out using the IBM Statistic SPSS version 26 and p-values of <0.05 were considered statistically significant.

2.4. Sensitivity analysis

Since the actual number of ≤5 for some categories of tea consumption in different anxiety levels was found, we performed a sensitivity analysis. For this analysis, we lumped up the anxiety level into two categories, i.e., "normal" and "anxiety" consisting of mild to moderate anxiety, marked to severe anxiety, and extreme anxiety. Meanwhile, the status of tea consumption was grouped into three categories, i.e., "non-tea drinkers", "seldom to 1 glass per day", and "≥2 glasses per day". In contrast to our main analysis, we applied a binomial logistic test to calculate crude ORs, adjusted ORs, and 95% CIs for this sensitivity analysis.

3. Results

3.1. Characteristics

A total sample of 332 medical students from four undergraduate schools at Medical Faculty, Universitas Lambung Mangkurat, Banjarmasin-Banjarbaru, Indonesia was involved in our study. These undergraduate schools are SoM, SoPH, SoP, and SoN. All data were collected online in December 2021 and written consents were obtained from all respondents.

The average age of respondents was 19.58 years old (±1.43). Our respondents were most likely females (70.8%), from SoM (49.7%), in the 7th semester (31.3%) of their study, from South Borneo as their origin of province (59.0%) and living independently (51.8%). Most of respondents reported to have poor sleeping quality (93.4%). Of all respondents, 93.4% and 52.1% had no personal and familial history of anxiety disorders, respectively and 39.2% of respondents had no information on their familial history of anxiety. None of respondents used drugs associated with anxiety (100.0%). Demographic data and baseline characteristics of respondents were presented in Table 1.

3.2. Bivariate analyses for the characteristics

Table 2 indicates the differences in demographic data and baseline characteristics of our respondents based on their anxiety levels. We found no significant different ($p > 0.05$) among respondents from different anxiety levels based on sex, length of study, residency status, sleep quality, and personal and familial history of anxiety. However, there were statistically differences ($p < 0.05$) in age, origin of school, and origin of province, i.e., $p = 0.029$, $p = 0.040$, and $p = 0.008$, respectively.

Table 1
Demographic data and baseline characteristics of the respondents.

Characteristics	Total n = 332
Age, year (mean ± sd)	19.58 ± 1.43
Sex, n (%)	
• Females	235 (70.8)
• Males	97 (29.2)
Schools, n (%)	
• SoM	165 (49.7)
• SoPH	67 (20.2)
• SoP	58 (17.5)
• SoN	42 (12.7)
Length of study, n (%)	
• 1 semester	85 (25.6)
• 3 semesters	71 (21.4)
• 5 semesters	72 (21.7)
• 7 semesters	104 (31.3)
Origin of province, n (%)	
• South Borneo	196 (59.0)
• Other provinces	136 (41.0)
Residency status, n (%)	
• Independent	172 (51.8)
• With parents or relatives	160 (48.2)
Sleep quality, n (%)	
• Good	22 (6.6)
• Poor	310 (93.4)
History of Anxiety, n (%)	
• Yes, diagnosed by a psychologist	8 (2.4)
• Yes, diagnosed by a doctor	14 (4.2)
• No	310 (93.4)
Familial history of anxiety, n (%)	
• Yes	29 (8.7)
• Nopli	173 (52.1)
• Unknown	130 (39.2)
Drug use associated with anxiety, n (%)	
• Yes	0 (0.0)
• No	332 (100.0)

Abbreviations: SoM = school of medicine; SoN = school of nursing; SoP = school of psychology; SoPH = school of public health.

3.3. Risk of anxiety for tea drinkers compared to non-tea drinkers

In Table 3, we estimated the ORs for anxiety for a different status of tea drinkers compared to non-tea drinkers. Compared to non-tea drinkers, respondents who rarely consumed tea (seldom) were associated with a lower risk of mild to moderate anxiety by 9% (Adj. OR 0.91, 95%CI: 0.47–1.77). Respondents who consumed 1 glass tea per day and 2–3 glasses per day were also associated with a decreased risk of mild to moderate anxiety by 20% (Adj. OR 0.80, 95%CI: 0.36–1.79) and 54% (Adj. OR 0.46, 95%CI: 0.15–1.37), respectively. Even though not statistically significant, these results showed that the lower risk of anxiety was associated with a higher dose of tea consumption (glass per day). Meanwhile, compared to non-tea drinkers, respondents who rarely consumed tea (seldom) were also associated with a lower risk of marked to severe anxiety by 45% (Adj. OR 0.55, 95%CI: 0.12–2.43).

3.4. Sensitivity analysis

In our sensitivity analyses (Table 4), we lumped up the anxiety level into binary categories, i.e., "normal range" and "anxiety". The status of tea consumptions was fall into 3 categories, i.e., "non-tea drinkers", "seldom – 1 glass per day", and "≥ 2 glasses per day". Compared to non-tea drinkers, respondents who consumed tea occasionally – 1 glass per day were associated with a lower risk of anxiety by 18% (Adj. OR 0.82, 95%CI: 0.46–1.46). However, this association was not statistically significant. In contrast, respondents who consumed tea ≥2 glasses per day were associated with a statistically significant reduced risk of anxiety by 67% (Adj. OR 0.33, 95%CI: 0.11–0.97) compared to non-tea drinkers.

Table 2
Bivariate analyses for demographic data and baseline characteristics of the respondents.

Characteristics	Anxiety levels				p-value
	Normal range (n = 251)	Mild to moderate (n = 69)	Marked to severe (n = 11)	Extreme (n = 1)	
Age, year (mean ± sd)	19.65 ± 1.38	19.51 ± 1.51	18.36 ± 1.50	20.0 ± NA	0.029[a]*
Sex, n (%)					
• Males	79 (81.4)	14 (14.4)	4 (4.1)	0 (0.0)	0.266 [b]
• Females	172 (73.2)	55 (23.4)	7 (3.0)	1 (0.4)	
Schools, n (%)					
• SoM	137 (83.0)	23 (13.9)	5 (3.0)	0 (0.0)	0.040[b]*
• SoP	40 (69.0)	16 (27.6)	1 (1.7)	1 (1.7)	
• SoPH	48 (71.6)	17 (25.4)	2 (3.0)	0 (0.0)	
• SoN	26 (61.9)	13 (31.0)	3 (7.1)	0 (0.0)	
Length of study, n (%)					
• 1 semester	61 (71.8)	19 (22.4)	5 (5.9)	0 (0.0)	0.646[b]
• 3 semesters	56 (78.9)	13 (18.3)	2 (2.8)	0 (0.0)	
• 5 semesters	54 (75.0)	16 (22.2)	1 (1.4)	1 (1.4)	
• 7 semesters	80 (76.9)	21 (20.2)	3 (2.9)	0 (0.0)	
Origin of province, n (%)					
• South Borneo	158 (80.6)	35 (17.9)	2 (1.0)	1 (0.5)	0.008[b]*
• Other provinces	93 (68.4)	34 (25.0)	9 (6.6)	0 (0.0)	
Residency status, n (%)					
• Independent	124 (72.1)	41 (23.8)	7 (4.1)	0 (0.0)	0.275[b]
• With parents or relatives	127 (79.4)	28 (17.5)	4 (2.5)	1 (0.6)	
Sleep quality, n (%)					
• Good	17 (77.3)	5 (22.7)	0 (0.0)	0 (0.0)	0.825[b]
• Poor	234 (75.5)	64 (20.6)	11 (3.5)	1 (0.3)	
History of Anxiety, n (%)					
• Yes, diagnosed by a psychologist	5 (62.5)	3 (37.5)	0 (0.0)	0 (0.0)	0.103[b]
• Yes, diagnosed by a doctor	6 (42.9)	7 (50.0)	1 (7.1)	0 (0.0)	
• No	240 (77.4)	59 (19.0)	10 (3.2)	1 (0.3)	
Familial history of anxiety, n (%)					
• Yes	18 (62.1)	10 (34.5)	1 (3.4)	0 (0.0)	0.069[b]
• No	126 (72.8)	38 (22.0)	9 (5.2)	0 (0.0)	
• Unknown	107 (82.3)	21 (16.2)	1 (0.8)	1 (0.8)	
Drug use associated with anxiety, n (%)					
• Yes	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	NA
• No	251 (75.6)	69 (20.8)	11 (3.3)	1 (0.3)	

Abbreviations: NA = not applicable; SoM = school of medicine; SoN = school of nursing; SoP = school of psychology; SoPH = school of public health.
a = ANOVA test; b = chi-square test; sd = standard deviation.
*statistically significant ($p < 0.05$).

4. Discussion

This study demonstrated that consumption of *C. sinensis* tea was associated with a lower risk of anxiety compared to non-tea drinkers after adjustment for potential confounders. This reduced risk is positively associated with the number of glasses of tea consumed. Even though statistically non-significant, compared to non-tea drinkers, consuming tea occasionally (seldom), 1 glass per day, and 2–3 glasses per day were associated with a reduced risk of mild-moderate anxiety by 9%, 20%, and 54%, respectively. Our sensitivity analysis confirmed these reduced risks for tea drinkers.

Our findings are consistent with previous studies performed in both

Table 3
Odds ratios for anxiety level among tea (*Camellia sinensis*) drinkers in Medical Faculty Universitas Lambung Mangkurat, Banjarmasin-Banjarbaru, Indonesia.

Tea consumption	**Normal range (n = 251)**	**Mild to moderate (n = 69)**	**Marked to severe (n = 11)**	Extreme (n = 1)	Level of Anxiety					
					Mild to moderate		Marked to severe		Extreme	
					Crude OR (CI 95%)	*Adj.* OR* (CI 95%)	*Crude* OR (CI 95%)	*Adj.* OR (CI 95%)	*Crude* OR (CI 95%)	*Adj.* OR (CI 95%)
Non tea drinkers, n (%)	73 (70.2)	25 (24.0)	5 (5.8)	0 (0.0)	1	1	1	1	1	1
Seldom, n (%)	89 (73.6)	26 (21.5)	6 (4.1)	1 (0.8)	0.62 (0.45–1.60)	0.91 (0.47–1.77)	0.68 (0.20–2.33)	0.55 (0.12–2.43)	NA	NA
1 glass per day, n (%)	50 (79.4)	13 (20.6)	0 (0.0)	0 (0.0)	0.76 (0.36–1.62)	0.803 (0.36–1.79)	NA	NA	NA	NA
2–3 glasses per day, n (%)	35 (87.5)	5 (12.5)	0 (0.0)	0 (0.0)	0.42 (0.15–1.18)	0.457 (0.15–1.37)	NA	NA	NA	NA
≥4 glasses per day, n (%)	4 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	NA	NA	NA	NA	NA	NA

Abbreviations: Adj. = Adjusted; CI = confident interval; NA= Not applicable; OR = odds ratio.
Adjusted for age, sex, schools, length of study, origin of province, status of residence, sleep quality, personal history of anxiety, familial history of anxiety, drug use associated with anxiety.

Table 4
Odds ratios for anxiety level among tea (*Camellia sinensis*) drinkers in Medical Faculty Universitas Lambung Mangkurat, Banjarmasin-Banjarbaru, Indonesia (*sensitivity analysis*).

Tea consumption	**Normal range (n = 251)**	Anxiety (n = 81)	Anxiety	
			Crude OR (CI 95%)	Adj. OR (CI 95%)
Non tea drinkers, n (%)	73 (70.2)	31 (29.8)	1	1
Seldom – 1 glass per day, n (%)	89 (73.6)	45 (24.5)	0.76 (0.45–1.31)	0.82 (0.46–1.46)
≥2 glasses per day, n (%)	50 (79.4)	5 (11.4)	0.30 (0.11–0.84)*	0.33 (0.11–0.97)*

Abbreviations: Adj. = Adjusted; CI = confident interval; OR = odds ratio.
Adjusted for age, sex, schools, length of study, origin of province, status of residence, sleep quality, personal history of anxiety, familial history of anxiety, drug use associated with anxiety.
*statistically significant ($p < 0.05$).

animals and humans. Consumption of oolong and chamomile tea is associated with a decreased risk of stress level and anxiety, respectively for graduate students.[11,12] An animal study done by Mirza et al. (2013) showed that with L-theanine as a suspected active ingredient, *C. sinensis* tea effectively reduces the risk of anxiety.[13] Supplementation of pure L-theanine 200–400 mg per day is also able to decrease stress and anxiety level.[8] As a supplementary agent for psychotic therapy, L-theanine reduces anxiety and general and psychopathology symptoms of schizophrenic disorders.[14] This amino acid influences neurotransmitter in the brain by increasing gamma amino butyric acids (GABA) receptor activity, leading to an increased level of dopamine and a supressed serotonin release. These processes ultimately induce a relaxation effect to overcome anxiety disorders, stress, and depression.[8]

Sakamoto et al. (2019) mentioned that the antianxiety effect of *C. sinensis* tea is linearly comparable to its dose.[15] As shown in our study, the higher dose of *C. sinensis* tea is associated with its increased antianxiety effect and a significant lower risk of anxiety is started from drinking 2 glasses of *C. sinensis* tea per day.

The compounds in tea leaves are partly determined by how the leaves are processed. White and green teas are minimally processed, meanwhile red teas and black teas are partially and fully fermented, respectively. These processes influence the nutritional value of tea. The least processed teas can retain the components that have positive effects on human health, such as phenolic compounds. Polyphenolics were found almost twice as high as in infusion of unfermented green teas compared to fully fermented black teas, whereas high content of phenolic compounds is found in green teas. Red and green teas are rich sources of antioxidants, particularly flavonoids.[16,17] A study using Ethiopian tea leaves demonstrated that level of L-theanine in green teas are higher than black ones by > 48 mg/g and by < 31 mg/g of dried aqueous extract, respectively.[18]

4.1. Strengths and limitations

We identified several strengths in this study. To the best of our knowledge, this was the first study assessing the reduced risks of anxiety for *C. sinensis* tea drinker for medical students. Furthermore, the unmeasured confounding effect from many potential confounders that might interfere the association between these variables had been reduced by adjusting for them in the statistical analyses.

However, some limitations are needed to acknowledge. Our concern is on an issue of recall bias. The gap between the event occurred and the time to recall partly affected by respondents' ability to recall information. The later the event is recalled, the information is less valid.[19] We recruited a relatively small sample size in this study that is able to lead to a low power to detect a relatively weak association.[20] The diagnosis of anxiety was not established by a psychiatrist nor a psychologist. Instead, it was determined according to the ZSAS questionnaire. It might potentiate a risk of misdiagnose. About 39.2% of familial history of anxiety was unknown. This incomplete information might lead to either under- or over-estimated risk because anxiety disorders are strongly associated with genetic factor. A person is more likely to have an anxiety disorder if their off-springs also experience it. This information may be veiled due to social or medical values.[21–24] Finally, even though we adjusted for some relevant important potential confounders, we did not have information on financial problem during study, the Grade Point Average (GPA), academic schedule, and eating habits that might influence the association as residual potential confounders.

4.2. Potential impact

These findings provide the evidence for community that a short-term consumption of *C. sinensis* tea (by about a week) might be beneficial as an alternative, non-pharmacological approach for reducing a risk of anxiety. Our study might also serve as a scientific basis for further assessment this such association for chronic use of *C. sinensis* tea and for extreme anxiety in the future research by employing in prospective studies or even clinical studies.

5. Conclusions

In conclusion, the consumption of *C. sinensis* tea was associated with a lower risk of both mild to moderate and marked to severe anxiety compared to non-tea drinkers even though not statistically significant. The risk of anxiety is significantly lower starting from 2 glasses of *C. sinensis* tea per day. The reduced risk was positively associated with the number of glasses of tea taken.

Source of funding

All authors did not receive any specific grants from funding agencies in the public, commercial, or not-for-profit sectors.

Ethical approval

This study protocol has been approved by The Health Research Ethic Committee from the Medical Faculty, Universitas Lambung Mangkurat, Banjarmasin, Indonesia with the approval number is No. 958/KEPK-FK ULM/EC/XII/2021 issued on December 17th, 2021.

Consent

Written informed consent was obtained from all respondents. Their right to autonomy, confidentiality, and withdrawn from the study was respected. Their participation was voluntarily.

Authors' contribution

MB contributed to the study conception and design, performed statistical analyses and interpreted the results, critically revised the manuscript for intellectual content, and finalized the manuscript. SNS collected the data, performed statistical analyses, interpreted the results, and drafted the manuscript. RF contributed to the study conception and design, and critically revised the manuscript for intellectual content. All authors approved the manuscript for publication and are responsible for the content and similarity index of the manuscript.

Declaration of competing interest

All the authors declared to have no conflict of interest.

Acknowledgement

We thank dr. Alfi Yasmina, M.Kes., M.Pd.Ked., M.Sc., Ph.D and Dr. dr. Sherly Limantara, SpKJ for their critical and constructive feedback on this study.

References

1 IHME. *Global Burden of Disease Collaborative Network Variable Time Span 1990 – 2017* [Internet]. Institute for Health Metrics and Evaluation; 2017 [cited 2020 Nov 20]. Available from: http://ghdx.healthdata.org/gbd-results-too.
2 Situasi Kesehatan Jiwa di Indonesia InfoDatin Pusat Data dan Informasi Kementerian Kesehatan RI [Internet]. 2019 [cited 2021 Nov 20]. Available from:: https://www.kemkes.go.id/.
3 Maulana TA. Gambaran tingkat kecemasan pada mahasiswa semester satu di Fakultas Kedokteran Universitas Kristen Maranatha tahun 2014. *Jurnal Kedokteran Maranatha*. 2014;1–10.
4 Sadock BJ, Sadock VA. *Kaplan & Sadock Synopsis of Psychiatry: Behavioral Sciences/ Clinical Psychiatry*. Philadelphia: Wolters Kluwer; 2015.
5 Townsend MC, Morgan KI. *Psychiatric Mental Health Nursing: Concepts of Care in Evidence-Based Practice*. eighth ed. Philadelphia: F.A Davis Company; 2017. F.A Davis Company.
6 Sudaryat Y, Kusmiyati M, Pelangi CR, Rustamsyah A, Rohdiana D. Aktivitas antioksidan seduhan sepuluh jenis mutu teh hitam (Camellia sinensis (L) O. Kuntze) Indonesia. *Jurnal Penelitian Teh dan Kina*. 2015;18(2).
7 Indarti D. *Outlook Teh Komoditas Pertanian Subsektor Perkebunan*. vol. 1. Jakarta: Sekretariat Jenderal Kementrian Pertanian, Pusat Data dan Sistem Informasi Pertanian; 2015.
8 Williams JL, Everett JM, D'Cunha NM, et al. The effects of green tea amino acid L-theanine consumption on the ability to manage stress and anxiety levels: a systematic review. *Plant Foods Hum Nutr*. 2020;75(12–23).
9 Wakabayashi C, Numakawa T, Ninomiya M, Chiba S, Kunugi H. Behavioral and molecular evidence for psychotropic effects in L-theanine. *Psychopharmacology*. 2012;219(4).
10 Shen M, Xu H, Fu J, et al. Investigation of anxiety levels of 1637 healthcare workers during the epidemic of COVID-19. *PLoS One*. 2020:15.
11 Hinton T, Jelinek HF, Viengkhou V, Johnston GA, Matthews S. Effect of GABA-fortified oolong tea on reducing stress in a university student cohort. *Front Nutr*. 2019;6.
12 Yuliyanti D, Mustikarani IK, Harti AS. *Pengaruh chamomile tea terhadap kecemasan saat pembelajaran daring dan skripsi pada mahasiswa Universitas Kusuma Husada Surakarta di masa pandemi. [Undergraduate thesis] Surakarta*. Fakultas Ilmu Kesehatan Universitas Kusuma Husada Surakarta; 2021.
13 Mirza B, Ikram H, Bilgrami S, Haleem DJ, Haleem MA. Neurochemical and behavioral effects of green tea (Camellia sinensis): a model study. *Pak J Pharm Sci*. 2013;26(3):511–516.
14 Ritsner MS, Miodownik C, Ratner Y, et al. L-theanine relieves positive, activation, and anxiety symptoms in patients with schizophrenia and schizoaffective disorder: an 8-week, randomized, double-blind, placebo-controlled, 2-center study. *J Clin Psychiatr*. 2011;72(1).
15 Sakamoto LF, Ribeiro MPR, Bueno AA, Santos OH. Psychotropic effects of L-theanine and its clinical properties: from the management of anxiety and stress to a potential use in schizophrenia. *Pharmacol Res*. 2019:147.
16 Klepacka J. Tea infusions as a source of phenolic compounds in the human diet. *Appl Sci Basel*. 2022;12(9).
17 Jakubczyk K, Kaldunska J, Kochman J, Janda K. Chemical profile and antioxidant activity of the Kombucha beverage derived from white, green, black dan red tea. *Antioxidants; Basel*. 2020;9(5).
18 Tadesse A, Hymete A, Bekhit AA, Salahudin FM. Quantification of total polyphenols, catechin, caffeine, l-theanine, determination of antioxidant activity and effect on antileishmanial drugs of Ethiopian tea leaves extracts. *Pharmacogn Res*. 2015;7(1).
19 Lacasse A, Ware MA, Bourgault P, et al. Accuracy of self-reported prescribed analgesic medication use: linkage between the Quebec pain registry and the Quebec administrative prescription claims databases. *Clin J Pain*. 2016;32(2).
20 Bakhriansyah M, Souverein PC, de Boer A, Klungel OH. Risk of myocardial infarction associated with non-steroidal anti-inflammatory drugs: impact of additional confounding control for variables collected from self-reported data. *J Clin Pharm Therapeut*. 2019;44(4).
21 Bakhriansyah M, Souverein PC, de Boer A, Klungel OH. Gastrointestinal toxicity among patients taking selective COX-2 inhibitors or conventional NSAIDs, alone or combined with proton pump inhibitors: a case–control study. *Pharmacoepidemiol Drug Saf*. 2017;26(10).
22 Rector NA, Bourdeau D, Kitchen K, Joseph-Massiah ML. *Anxiety Disorders an Information Guide*. vol. 80. Toronto: Centre for Addiction and Mental Health; 2016.
23 Leggett A, Ganoczy D, Zivin K, Valenstein M. Predictors of pharmacy-based measurement and self-report of antidepressant adherence: are individuals overestimating adherence? *Psychiatr Serv*. 2016;67(7).
24 Costanzo S, di Castelnuovo A, Donati MB, Iacoviello L, de Gaetano G. Alcohol consumption and mortality in patients with cardiovascular disease: a meta-analysis. *J Am Coll Cardiol*. 2010;55(13).

Tea_anxiety_disorder_medical_students.pdf

ORIGINALITY REPORT

3%	0%	6%	4%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	"Abstracts", Pharmacoepidemiology and Drug Safety, 2019 Publication	2%
2	Submitted to Christchurch Polytechnic Institute of Technology Student Paper	2%

Exclude quotes	On	Exclude matches	< 2%
Exclude bibliography	On		