Original Article

Effectiveness of Ginger Aromatherapy on Blood Pressure Among Hypertensive Patients in a Community Health Center in Indonesia: A Quasi-Experimental Study

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Abstract

Background: Hypertension is a disease caused by several factors including genetic factors, physical changes, unhealthy lifestyles, the presence of certain medical conditions. One way to manage hypertension in a non-pharmacological way is using aromatherapy.
Objective: This research was conducted to determine the effect of ginger aromatherapy on blood pressure in hypertensive patients at the Ngemplak II Health Center, Sleman Regency.
Methods: The research design used was quasy experimental design with a non-equivalent control pre-posttest design approach. The study population was all hypertensive patients who conducted examinations at the Ngemplak II Health Center, Sleman Regency. The number of samples in this study were 50 respondents who were divided into 2 groups, namely 25 intervention groups and 25 control groups taken by purposive sampling technique. The intervention group was given ginger aromatherapy with a duration of 30 minutes per day for 3 days using a diffuser, while the control group only measured blood pressure on the first day and the third day.
Results: The results showed that a small proportion of hypertensive patients were elderly (38%), mostly female (64%), and mostly worked as farmers (52%). Data analysed using the Mann-Whitney test showed that there was a significant difference in mean systolic blood pressure between the intervention and control groups (p value <0.001), however, between the intervention group and the control group, there is no significant difference in diastolic blood pressure(p = 0.460).
Conclusion: Ginger aromatherapy has been proven effective as a non-pharmacological therapy for controlling blood pressure in hypertensive patients. Further research with a more accurate design and stricter control of confounding factors is recommended to follow up on the results of this study.

Keywords: Aromatherapy, Blood pressure, Community health center, Experimental desigh, Gingger, Hypertension

INTRODUCTION

High blood pressure is defined as systolic blood pressure greater than 140 mm Hg and diastolic blood pressure greater than 90 mm Hg, which is detected in 2 assessments with a five-minute interval and after adequate rest (1). Hypertension, characterized by an increase in blood pressure, can cause symptoms such as headaches, dizziness, and heart palpitations (2).

This disease is often known as the "silent killer" because most sufferers are asymptomatic (3). Hypertension is part of a non-infectious health problem that is the main factor causing death globally, so it requires special attention from medical personnel.

It is recorded that 1.28 billion people are affected by hypertension worldwide, with the majority living in countries with lower middle economy (2). In middle-income countries around the world, hypertension is the seventh leading cause of death in 2019 (4). Indonesia as a middle-income country is also not free from the problem of hypertension. In 2016 hypertension was in 10th position in the list of the top 10 causes of death in Indonesia which then increased in 2017-2019 to 8th position primary causes of mortality in Indonesia (5). Based on the Riskesdas report (7), in Indonesia the prevalence rate of hypertension cases reached 34.11%. This figure is higher than the 2013 Basic Health Research report, which was 25.8%. Hypertension cases in the Special Region of Yogyakarta Province are ranked 12th, namely 32.86% (7). Meanwhile, the prevalence of hypertension in Sleman district ranks 3rd at 32.01% (8). Data from the Sleman Regency health profile from 2017-2020 hypertension rates continue to increase. In 2020, 364,777 cases of hypertension were recorded in Sleman Regency, while in 2017 there were 66,618 cases of hypertension (9). Looking at the existing data, hypertension is common in DI Yogyakarta, especially in the Sleman area, is quite high. This illustrates that most people in the Sleman area need special attention to be treated to control and prevent hipertension.

Heredity, physical changes, unhealthy lifestyles, and certain health disorders are the causes of the increase in hypertension worldwide, including in Indonesia (10). Without proper treatment, high blood pressure can cause various health complications, such as kidney disease, heart disease, and stroke (2). The increasing prevalence of hypertension requires attention to proper management and control. According to the Ministry of Health (11), Hypertension control goals is to reduce complications, morbidity, and death due to hypertension. Hypertension management is divided into two types including pharmacological and non-pharmacological approaches. Non-pharmacological treatment is of concern to the public for complementary treatment options because it is not difficult and affordable to implement besides, non-pharmacological treatment does not trigger negative effects. An approach that can be applied for hypertension management in a non-pharmacological way is using aromatherapy. The purpose of using aromatherapy is so that blood pressure in people with hypertension can go down. Aromatherapy is an additional treatment method that utilizes oil extracts. This therapy can affect the psychological condition, memory, and feelings of individuals (12).

There are many aromatherapies that can lower blood pressure such as lavender, ylang ylang, and lemongrass aromatherapy. In lowering blood pressure, ginger aromatherapy can be applied to people with hypertension. Ginger essential oil contains active compounds shogaols, gingerols and zingerones (13). These compounds are known to have vasodilatory, anti-inflammatory, anticoagulant, antioxidant, and hypotensive effects. Ginger essential oil in aromatherapy has the effect of reducing stress and improving blood circulation. Ginger aromatherapy lowers blood pressure in hypertension through its relaxing effect (12). From the research submitted by Apriani and Wahyuni (14), it was discovered that the mean blood pressure differedin infertile women with hypertension pre and post administration of ginger aromatherapy with a difference of 5.91 mmhg for diastolic blood pressure and 10 mmhg for systolic blood pressure. This finding is supported by Alfillaturrohman (15), which explains that pre-test and post-test systolic blood pressure in the treatment group has a p value of 0.004 ($p < \alpha$), on the other hand diastolic blood pressure has a p value of 0.002 ($p < \alpha$). This indicates a significant effect in reducing blood pressure.

From the above description, the researcher wishes to carry out further research entitled "The Effect of Ginger Aromatherapy on Blood Pressure in Hypertensive Patients at the Ngemplak II Health Center, Sleman Regency". Researchers used non-pharmacological therapy, namely aromatherapy to be studied at the Ngemplak II Health Center because aromatherapy has a relaxing effect which hopes to reduce blood pressure and become a reference for the Ngemplak II Health Center to reduce patient boredom in taking antihypertensive drugs. Researchers chose aromatherapy also because aromatherapy is one of the non-pharmacological therapies that has minimal side effects. Researchers chose ginger

as an aromatherapy ingredient in this study because ginger contains gingerol and zingiberol compounds which have vasodilatory effects. The innovation in this study lies in the method of aromatherapy administration and the duration of the intervention. The method of aromatherapy administration in this study uses a steam diffuser, whereas previous studies only used tissues infused with ginger extract. The duration of the intervention that I will provide is for 3 consecutive days, carried out once a day for 30 minutes in the morning, in contrast to previous studies that provided interventions for 15 minutes over a span of 6 consecutive days in the morning and evening.

METHODS

Design

The researcher used a quasi-experimental design with a non-equivalent control pre-post test. In this study, researchers used an intervention group with ginger aromatherapy and a control group without ginger aromatherapy. Group allocation was determined by the researcher using the method of the first respondent who agreed to participate in the study being assigned to the intervention group and the second respondent being assigned to the control group. Respondents who met with the researcher an odd number of times were assigned to the intervention group, while respondents who met with the researcher an even number of times were assigned to the control group.

Sample

This study involved all hypertensive patients who underwent examination at the Ngemplak II Community Health Centre, Sleman Regency. The study sample consisted of 50 individuals. Sampling was conducted using purposive sampling, based on the following inclusion criteria: age 18-75 years, compos mentis level of consciousness, hypertensive patients residing in the Ngemplak 2 Health Centre service area, hypertensive patients with good sense of smell (not suffering from a cold, flu, rhinitis, or sinusitis), hypertensive patients willing to participate as respondents, and exclusion criteria, namely pregnant women, asthma patients, and those allergic to ginger. The researchers did not use random sampling in this study due to limitations in time, location, and resources.

Instruments

The blood pressure of all respondents was measured using the same tensiometer, namely a digital sphygmomanometer with the brand OMRON HEM-7120. This tensiometer has been calibrated and is suitable for use for 2 years. This tensiometer was newly purchased and used when the study was conducted. Demographic data and blood pressure measurements of the respondents were collected using an observation form. The observation form used by the researcher included name, age, gender, occupation, and systolic and diastolic blood pressure measurements before and after the test.

Data collection

For respondents in the intervention group: the researcher made an appointment with the respondents at the Ngemplak II Community Health Centre. Respondents in the intervention group were given ginger aromatherapy for 3 consecutive days, once a day for 30 minutes. The researchers administered the intervention to the intervention group respondents between 7:00 AM and 12:00 PM at their respective homes. The researchers measured blood pressure (pre) at the patients' homes on the first day before the intervention was administered. The researchers measured blood pressure (post) after the third day of the intervention. For the control group, the first blood pressure measurement (pre) was conducted at the health centre when the participants visited Ngemplak II Health Centre. The second blood pressure measurement (post) was conducted at the participants' homes on the third day around 13:00-17:00 WIB. After the blood pressure measurement (post), the control group respondents were given ginger aromatherapy intervention with a frequency of 1 time for 30 minutes. Blood pressure measurements of respondents were taken by the researchers themselves without assistants.

Data analysis

Univariate analysis is presented in the form of a frequency distribution table and percentage. Bivariate analysis in this study used the Mann Whitney test and the Wilcoxon test.

Ethical considerations

The research ethics test was carried out at the health research ethics committee of the Panti Rapih hospital. Ethical feasibility was declared ethically feasible to be carried out with letter number 071 / SKEPK-KKE / VI / 2024.

RESULTS

Table 1. Distribution of Respondent Characteristics at Ngemplak II Community Health Center, Sleman Regency (n=50)

Respondent characteristics	Intervention group		Control Group		Total amount	
	n = 25	%	n = 25	%	n =50	%
Age						
Early adulthood (26-35 Years old)	0	0	1	4	1	2
Late adulthood (36-45 Years old)	0	0	3	12	3	6
Early elderly (46-55 Years old)	5	20	5	20	10	20
Late elderly (56-65 Years old)	8	32	9	36	17	34
Seniors (>65 Years old)	12	48	7	28	`19	38
Gender						
Female	18	72	14	56	32	64
Male	7	28	11	44	18	36
Employment						
Farmers	13	52	13	52	26	52
Housewife	11	44	8	32	19	38
Teacher	0	0	2	8	2	4
Gymnastics instructor	0	0	1	4	1	2
Merchant	1	4	0	0	1	2
Retired	0	0	1	4	1	2

Table 1, show that a small portion of the age characteristics of the intervention group respondents were dominated by the elderly age group (48%), while for the control group a small portion was dominated by the late elderly age group (36%). The gender characteristics of the intervention group respondents were mostly dominated by women (72%) as well as the control group were mostly dominated by women (56%). The occupational characteristics of the intervention group respondents were mostly dominated by farmers (52%) as well as the control group were mostly dominated by farmers (52%).

Table 2. Results of bivariate analysis of control group

Blood pressure	n	Median (Min-Max) unit mmHg	P *value*
First day systolic (*pre*)	25	140 (126-187)	0,042
Third day systolic (post)		140 (108-173)	
First day diastolic (pre)	25	81 (60-92)	0,345
Third day diastolic (post)		80 (57-101)	

Table 2 display the control group blood pressure. For systolic blood pressure, a significant difference is observed on the first and third days ($p < 0.05$). For diastolic blood pressure in the control group $p > 0.05$, indicating no significant difference in pre and post diastolic blood pressure.

Table 3. Results of bivariate analysis of intervention group(n=25)

Blood pressure	**N**	**Median (Min-Max) unit mmHg**	**P *value***
Systolic (pre)	25	143 (119-170)	< 0,001
Systolic (post)		128 (108-147)	
Diastolic (pre)	25	82 (66-99)	0,172
Diastolic (post)		83 (50-92)	

Table 3 provides an overview of the mean systolic blood pressure in the group before and after the intervention. The p-value is <0.001 (p-value <0.05), which shows a difference in the mean systolic blood pressure. The p-value for diastolic blood pressure is 0.172 (p>0.05), indicating no significant change.

Table 4. Blood pressure after being given ginger aromatherapy (n=50)

Blood pressure	Group	n	Median (Min-Max) unit mmHg	P value
Post systolic	intervention control	25 25	134 (108-173)	<0,001
Post diastolic	intervention control	25 25	80 (50-101)	0,460

From table 4 the *post-intervention systolic blood pressure* shows a *p value of* <0.001 (p *value of* <0.05), leading to the conclusion that means that there is a significant difference in the mean systolic blood pressure between the intervention group and the control group. Meanwhile, the post-*diastolic* blood pressure showed a p *value of* 0.460 (p *value* > 0.05), which means that there is no significant difference in the average *diastolic blood* pressure of respondents in the intervention group and the control group.

DISCUSSION

Characteristics of respondents by age

The research shows that most respondents were >65 (38%), but hypertension incidence increased from early elderly age. The results of this study show differences compared to the findings of Suaib, Cheristina & Dewiyanti (2019)(16) where the majority of respondents with hypertension were in the late elderly age group, namely 60-65 years (71%). however, the results of this study agree with Wahyuningsih and Maryatun (17) which states that *Elderly people* aged 60-74 (51.5%) are most affected by hypertension. Similarly, the findings of research conducted by Mulyasari, Adi, & Sari(18) also shows that most hypertensive people surveyed were aged 60-74 (68.4%). Older people are at increased risk of high blood pressure due to changes in the structure of blood vessels as they age(18). Syarli and Arini (19) mention mention The incidence of hypertension is influenced by age. As we age, the arterial walls thicken due to collagen accumulation in the muscular layer, narrowing and stiffening the vessels. The occurrence of hypertension in the elderly is caused because as people get older, blood vessels become stiff due to the aging process, which causes blood pressure to increase.

Characteristics of respondents by gender

The majority of respondents were female, with 32 respondents (64%). The findings are the same as research conducted by Faridah, Pramestirini, Nisa, & Sholikah (20) which states that women suffer the most from hypertension. Research conducted by Wahyuningsih & Maryatun (17) also shows that the respondents with the highest rate of hypertension are women, with a total of 21 (63.6%). Research conducted by Wahyuni, Ekawati, Harokan, & Murni (21) also states that hypertension is often suffered by women than men. The incidence of hypertension is closely related to gender, with hypertension occurring more frequently in menopausal women (22). Women who experience menopause are five times more at risk of suffering from hypertension than men (23). Nurhayati, Ariyanto, & Syafriakhwan (24) state that one of the causes of hypertension in menopausal women is due to a decrease in estrogen levels. This is supported by Podungge (25), who states that estrogen hormones greatly contribute to an increase in *High Density Lipoprotein* (HDL) levels to protect women who are still of childbearing age. HDL levels are one of the elements to avoid atherosclerosis (26). Women are at greater risk of hypertension, especially during menopause, due to decreased estrogen levels, which impact HDL levels. A decrease in HDL increases the risk of atherosclerosis in women, which can lead to hypertension.

Characteristics of respondents based on occupation

The majority of respondents (26 or 52%) worked as farmers. The findings are the same as those of Faridah (20), where a small proportion of respondents with hypertension worked as farmers (44.4%). Research conducted by Milani

& Burhanto (27) also found that a small proportion of respondents with hypertension worked as farmers (41.2%). Hidayat, Setiani, Dewanti, & Darundiati (28) concluded that the duration of work, the amount of pesticide use, the frequency of pesticide spraying, and the use of personal protective equipment are factors that influence pesticide exposure to hypertension in farmers. Arifah & Wijayanti (29) also concluded that the time and direction of pesticide spraying and the use of personal protective equipment (PPE) are closely related to the occurrence of hypertension in farmers. Mawaddah, Sugiarto, & Kurniawati (30) also concluded that the factors that affect blood pressure in farmers are working hours and the use of PPE. Pesticide exposure, which is influenced by various factors, can interfere with the function of the enzyme acetylcholinesterase, causing poisoning and high blood pressure (28). Lower levels of acetylcholinesterase in the blood will cause an increase in blood pressure(30). Pesticides, after entering the body, bind to the enzyme acetylcholinesterase which blocks the breakdown of acetylcholine. This causes acetylcholine to accumulate in the nervous system which activates the sympathetic nerves more intensely. As a result, there is an increase in cardiac output and peripheral blood pressure which leads to hypertension (28). Acetylcholinesterase plays a role in breaking down and activating acetylcholine (29). Acetylcholine is a neurohormone found at the ends of nerves and smooth muscles, functioning as a chemical mediator to transmit nerve signals (29). In the cardiovascular system, acetylcholine plays a role in lowering the heart rate, reducing the force of the heart muscle, and dilating the blood vessel channels to lower blood pressure (31). Incomplete use of PPE will cause high exposure to pesticides in the body, thus disrupting the work of the acetylcholinesterase enzyme. This is made clear by the findings of Hidayat (28) which show that farmers who do not wear complete personal protective equipment (PPE) have a seven times higher risk of developing hypertension compared to farmers who use complete PPE. Research conducted by Arifah & Wijayanti (29) also explains that farmers who spray pesticides with poor-quality personal protective equipment are 3.675 times more likely to suffer from hypertension than farmers who use good-quality personal protective equipment.

Average difference in blood pressure in the control group

This study shows a change in systolic blood pressure, from level 3 to level 2 in the control group. The researcher assumes that the decrease in *systolic blood* pressure on the third day in the control group is closely related to the half-life of the medication, where during the half-life of the medication the body still reacts to the medication so that blood pressure decreases due to the influence of the medication. During the blood pressure measurements taken by the researcher on the control group respondents, almost all respondents had their blood pressure measured at night and around 90% of the respondents took medication at night. Where this is still within the medication half-time. Mazaya, Rifkia, & Chairani (32) state that amlodipine 10 mg has a half-time of 12-20 hours. Amlodipine 10 mg takes 12 hours to reach the highest point effect of blood pressure reduction (23).

The results showed no significant difference in the control group. The absence of a significant difference in the average diastolic blood pressure of the control group was influenced by the blood pressure condition of the respondents, most of whom were already in the normal-high normal range on the first to third day. This can be seen from the diastolic blood pressure of the control group respondents on the first to third day, most of whom were in the normal-high normal range, namely 80%. Only 16% of the control group respondents suffered from grade 1 hypertension and 4% suffered from grade 2 hypertension. Diastolic blood pressure that was in the normal-high normal range did not experience a decrease in blood pressure because it was already within the therapeutic target range. This explanation is supported by the findings of Husnatika (23) which stated that there was no significant relationship between the administration of antihypertensive drugs and the achievement of blood pressure targets in prehypertensive patients, while in stage 1 and stage 2 hypertension patients there was a significant relationship between the administration of antihypertensive drugs and blood pressure targets.

Average difference in blood pressure in the intervention group

The test results show that the mean value of *systolic blood* pressure before treatment and *after* treatment has a difference from 143 mmHg

to 128 mmHg. Looking at the hypertension category according to the ESC (33), *systolic blood* pressure of 143 mmHg is categorized as grade 1 hypertension, while *systolic blood* pressure of 128 mmHg is categorized as normal. Judging from the maximum value, the *systolic* blood pressure also has a change, namely from the previous 170 mmHg to 147 mmHg after being treated. According to ESC (33), *systolic* blood pressure of 170 mmHg falls into the category of grade 2 hypertension, while *systolic* blood pressure of 147 mmHg falls into the category of grade 1 hypertension. Compared to the control group, the median value of *systolic blood* pressure on the third day was still in the category of grade 1 hypertension, while for the intervention group the median value of *systolic blood* pressure after treatment was in the normal category. Looking at the median value of *systolic* blood pressure *pre* and *post* ginger aromatherapy shows a decrease in blood pressure which, before ginger aromatherapy, was in the grade 1 hypertension category to normal after ginger aromatherapy. The results of this study are in line with the opinion of Apriani & Wahyuni (14) who state that there is a difference in the average *systolic* blood pressure *pre* and *post* ginger aromatherapy. Giving aromatherapy with a longer duration will provide an optimal relaxation effect. The optimal relaxation effect will decrease the body's vasoconstrictor function and facilitate blood flow, which can stabilize blood pressure (14). Relaxed body position results in the parasympathetic nervous system the parasympathetic nervous system to reduce heart rate, thus causing a decrease in cardiac output and lowering vascular pressure. and lower vascular pressure. In addition, the decrease in blood pressure blood pressure can occur because the sensation of relaxation helps to relax the body's muscles, which which lowers the pressure, causing the vasculature to dilate and eventually reduce the high ultimately reducing the high blood pressure (Mariza and Kalusum in Kinasih et.al., 2018)(34).

According to Mariza & Kalusum in Kinasih (34), aromatherapy lowers blood pressure through the *olfactory nerve* which receives the concentration of aromatherapy chemical compounds with aromas, then impulses are sent to the hypothalamus and affect the central nervous system. From here, the sensation of relaxation is received as a signal that produces a calming effect. This calm state of the body will cause the blood vessels to dilate and lower the heart rate. A decreased heart rate and dilated blood vessels will cause blood pressure to drop. Ginger essential oil gives off a unique aroma from the substance *zingiberol.* The hypothalamus will respond to the substance *zingiberol* which affects the central nervous system (14). The central nervous system, stimulated by the substance *zingiberol*, will instruct the pituitary gland to produce the hormone endorphin, causing euphoria or relaxation, which reduces the body's vasoconstrictor activity and increases blood flow (15).

There was no change in diastolic blood pressure after the intervention related to the time and frequency of the intervention. In this study, researchers only provided ginger aromatherapy to respondents for 3 consecutive days, once daily, inhaled for 30 minutes. Providing aromatherapy for a longer duration will provide optimal relaxation. Optimal relaxation will reduce the body's vasoconstrictor function and improve blood flow, which can stabilize blood pressure (14).

Effect of ginger aromatherapy on the intervention and control groups

Research shows that in the control and the intervention groups there is a difference in systolic blood pressure. Respondents in the control group showed a decrease of only one level in the hypertension category. For the intervention group, respondents who received ginger aromatherapy once a day for 30 minutes for 3 days using a steam diffuser device saw their systolic blood pressure decrease by 2 levels in the hypertension category, from grade 1 to normal. This finding is consistent with the results of Alfilaturrohman (15) which states that ginger aromatherapy lowered systolic blood pressure in the experimental group. Research by Apriani & Wahyuni (14) also came to the conclusion that the administration of ginger aromatherapy has an effect in lowering *systolic* blood pressure in persons with hypertension. Ginger essential oil contains the active compounds *shogaols*, *gingerols* and *zingerones* (13). Ginger aromatherapy lowers blood pressure in hypertension through its relaxing effect (12). Ginger essential oil gives off a distinctive aroma due to the presence of zingiberol. When inhaled, aromatic oil molecules stimulate memory and emotional responses by activating the hypothalamus, which mediates

and regulates signals to the brain. The brain then generates a message that is forwarded into an action of releasing electrochemical substances that cause a relaxing effect. This effect reduces the body's vasoconstrictor activity and increases blood flow, which ultimately leads to a decrease in blood pressure (14).

In contrast to *systolic blood* pressure, *diastolic* blood pressure does not show a significant difference. This finding is different from the research of Alfilaturrohman (15) which states that there is a difference in *diastolic blood* pressure between the control group and the experimental group after being given ginger aromatherapy in the experimental group. The findings of Apriani & Wahyuni (14) also conclude different results with the researchers that the administration of ginger aromatherapy has an effect in lowering *diastolic blood* pressure in hypertensive patients. The absence of a difference in the average diastolic blood pressure between the control group and the intervention group is closely related to the time and frequency of the intervention given. The time and frequency of ginger aromatherapy given by the researcher were still insufficient so that there was no significant difference in the average diastolic blood pressure between the control group and the intervention group. The researchers' assumptions are supported by the results of a study by Apriani & Wahyuni (14) who conducted a study with a longer time and frequency of ginger aromatherapy administration, namely 2 times a day for 6 consecutive days with a duration of 15 minutes, where the results showed a difference in the average diastolic blood pressure before and after administration of ginger aromatherapy. The condition of the respondents' blood pressure which was still controlled in the normal-high and normal range also affected the results of the ginger aromatherapy intervention given. This can be observed from the condition of the respondents' diastolic blood pressure between the control group and the same intervention group, where most were in the normal-high normal range.

CONCLUSION

The study showed a significant difference in systolic blood pressure between the intervention group and the control group but there was no significant difference in diastolic blood pressure between the intervention group and the control group in hypertensive patients at the Ngemplak II Public Health Center, Sleman Regency. Although the results of the intervention showed positive results, future interventions should use a randomised design to improve generalisability. Longitudinal studies and strict control of all confounding variables are also needed to investigate the long-term effects of ginger aromatherapy on blood pressure in hypertensive patients.

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Author Contributions

A.L.L. conceptualized and designed the study, carried out data collection and analysis, and drafted the manuscript. T.T.M. contributed to the refinement of the methodology, interpretation of data, and critical revision of the manuscript. F.A.R.S. supported literature review, formatting, and final proofreading. All authors read and approved the final version of the manuscript for submission.

Conflict of Interest Disclosure

The authors declare that there are no conflicts of interest related to this research, authorship, or publication of this article.

Data Availability Statement

The datasets generated and analyzed during the current study are not publicly available due to confidentiality agreements with participants but are available from the corresponding author upon reasonable request.

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