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Research Article

Correlation Between Pranayam and Occurrence of Covid-19: An Observational Study

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Abstract: Due to the widespread COVID-19 outbreak, people are consistently exposed to difficult circumstances and are more likely to become infected. Yoga includes the practice of Pranayama, which is a method of controlled breathing. It is well known to boost immunity and lessen illness. However, there has yet to be a scientific investigation on the effectiveness of Pranayama in avoiding COVID-19. This research aimed to study the association between Pranayam and the occurrence of COVID-19. The study's objectives are to increase awareness amongst the population regarding the importance of practicing Pranayam for strengthening respiratory system functions and immunity. A cross-sectional study was conducted among 100 Subjects between the age groups 18 to 60. Group A comprises subjects practicing daily Pranayama, and Group B is not practicing Pranayama. Then incidence of COVID in both groups was assessed based on diagnostic criteria by filling out pre-designed proforma, and a comparison was made by statistical analysis. Subjects in Group A practicing daily Pranayama showed less percentage of COVID-19 infection. Also, the positive subjects had no symptoms, or the severity of symptoms was less than Group B subjects not practicing Pranayama. The comparison of the groups was statistically significant. It may be due to increased strength and immunity in subjects practicing Pranayama. This study concluded that Pranayama proved beneficial in the prevention and fought against COVID infection.

Keywords: Anulomvilom**,** COVID 19, Immunity, Kapalbhati, Pranayama, Yoga.

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1. INTRODUCTION

One of the Ashtanga yogas described in Hatha yoga is Pranayama. It is a yogic breathing method that is very helpful in boosting the immune system and strengthening respiratory muscles.[1] As a result, it aids in preventing numerous illnesses, including COVID-19. The healing process is accelerated when the body has a high oxygen level. By performing routine breathing exercises, the body can increase the amount of oxygen it can absorb. This enhanced oxygen intake speeds up and accelerates the healing process. The upper respiratory tract was the site from where the Coronavirus primarily entered the body. It mainly damages, infects, and causes fibrosis in the upper region of the lungs. Rapidly falling blood oxygen levels (O2) are harmful and potentially fatal. Breath retention is known as Pranayama. It falls under the Prashantak Pranayama (calming) category.[2] Eight different types of Pranayama exist. According to the Hathayoga Pradipika, Bhramari Pranayama is a type of Pranayama that creates equilibrium between the ida and pingala nadi so that prana can flow in the sushuma nadi (spinal cord). [3] The COVID-19 pandemic is considered the most remarkable illness of the twenty-first century. The Coronavirus, a subgroup of the SARS virus family, is the cause. It is a protein-coated single-stranded RNA (SS-RNA) virus. The spike glycoprotein that may be detected on its envelope gave rise to the name Corona. The virus spread worldwide, affecting millions of people of all ages and posing a societal threat. Numerous vaccinations became available as life savers due to advanced infrastructure and technology, and development continues today. Therefore, the body's immune system and lung capacity are the main areas of emphasis in the fight against this infection. Yoga and its breathing exercises known as Pranayama emerged during this discussion as an efficient way to increase the body's immunity. The word "pranayama" is a combination of the Sanskrit words "prana," which means the breath of life or vital energy, and "ayama," which means expansion, regulation, or control. It deliberately alters one's breathing pattern while seated, including quick diaphragmatic, slow, deep breathing, alternate nostrils, and breath holding or retention.[4] In Pranayama breathing, inhalation (puraka) activates the nervous system and fills the lungs with fresh air; retention (kumbhaka) raises the body's temperature and aids in increasing the absorption of oxygen; and exhalation (rechak), which forces toxic and impure air out of the body by contracting the intercostal muscles. All systems receive vital energy because of how well these organs function. Proper ratios between inspiration, expiration, and retention must be maintained for Pranayama's effectiveness.[5] It helps increase physical and mental well-being[6,7] Research studies proved that practicing Pranayama could modulate the (ANS) autonomic nervous system[8], improve sleep pattern[9], enhances immunity[10], and decreases stress[11], anxiety[12,13], and depression[14]. Daily practicing Pranayama also had neuroprotective effects[15] and benefits like cardiac autonomic control and breathing function.[16] In addition to these health indicators, there is some evidence that pranayama exercises boost the respiratory system by enhancing the immune system and lung function. Additionally, it improves the body's anti-inflammatory response, which is crucial for COVID-19 defense and recovery. Researchers have found some evidence that yogic practices can decrease medication use as well as help with symptoms in two systematic reviews of yoga and asthma. The AYUSH ministry recommended [17,18] Pranayama practice as a preventative, therapeutic, and restorative measure for post-COVID symptoms.

1.1. Need of Study

The COVID pandemic has caused a large loss of human life and presented public health systems worldwide, not only in India, with never-before-seen difficulties. Due to our fear of this disease's constant mutation, many of us have remained indoors. This forced confinement has increased the burden on our bodies and minds. This public health problem has highlighted the need to boost the immune system. Adopting a healthy lifestyle is crucial for achieving this. Yoga is a very sophisticated, age-old practice rooted in Indian philosophy. Exercise, controlled breathing, and mental focus are all part of it. Yoga is endorsed for its health benefits by numerous scientific studies. The immune system is strengthened as a result. In addition, the respiratory system functions better when breathing exercises like Pranayama are used. Many medical professionals and experts have recommended that persons with minor covid-19 symptoms who had been instructed to isolate themselves at home would benefit from practicing yoga asanas and breathing techniques, albeit cautiously.[19] It is essential to strengthening the pulmonary system because the infection immediately affects the lungs. Additionally, individuals who had recovered from the COVID infection were recommended to practice Pranayama.[20] Thus, this case-controlled study aimed to investigate the relationship between Pranayama and the occurrence of COVID-19. It would raise awareness of COPD and other respiratory conditions and assist in preventing them. The study was conducted to establish the correlation between Pranayama and its effects on the occurrence of COVID-19. The research objectives are to study the risk factors of COVID-19 and the effects of Pranayama on the occurrence of Covid-19.

2. MATERIAL AND METHODS

Place of work: Mahatma Gandhi Ayurveda College, Ayurveda and Research Centre, Salod (H) Wardha.

2.1. Sample size calculation

The sample size was calculated using open epi software for an unmatched case-control study.[21] For which

Table 1: Sample Size for Unmatched Case-Control Study

For:		
Two-sided confidence level(1-alpha)		95
Power(% chance of detecting)		80
The Ratio of Controls to Cases		1
The hypothetical proportion of controls with exposure		6.59
The hypothetical proportion of cases with exposure:		1.05
The least extreme Odds Ratio to be detected:		0.15
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Sample Size - Cases	188	187	222
Sample Size - Controls	188	187	222
Total sample size:	376	374	444

The total sample size calculated was 376 188 in each Group. But as this was a time-bound STS study, only 100 samples were taken. Sample size-100

2.2. Grouping

Group A (N=50) - Subjects practicing Pranayama daily (Aged between 18 to 60 years)
Group B (N=50) - Subjects not practicing daily Pranayama. (Age between 18 to 60 years)

2.3. Study type

A case-control Study

2.4. Study Design

A case-control study was conducted among subjects practicing Pranayama and not practicing daily Pranayama and the history of occurrence of COVID-19 in them. A total of 100 people were enrolled in the study. They were divided into two groups. Group A comprised subjects practicing daily Pranayama, and Group B comprised subjects not practicing daily Pranayama. They were assessed for the incidence of COVID-19 by asking a predesigned and validated questionnaire. Data were analyzed statistically by simple proportions.

2.5. Ethical clearance and approval

Ethical clearance and permission were obtained from the Institutional ethical committee (MGACHRC/IEC/May 2022/473). Before interviewing, the informed consent of the respondent was taken.

2.6. Diagnostic criteria

Positive RT-PCR test with or without symptoms was considered as having COVID-19.

2.7. Duration of Study

6 months (From June 2022 to December 2022)

2.8. Inclusion criteria

1. Subjects willing to give consent within the age group of 18 to 60 years of either sex
2. Group A – Subject practicing daily Pranayama
3. Group B – Subject not practicing daily Pranayama

2.9. Exclusion criteria

Subjects have respiratory disorders like Chronic Obstructive Pulmonary Disease, Bronchial Asthma, Bronchitis, Bronchiectasis, and Emphysema.

Table 2: Pranayama (breathing) protocol for the morning session (30 min)

Sr.No.	Practices	Name of rounds	Duration	Rounds
1	Preparation for Pranayam(9 min)	Prayer	3 deep breathing of prayer of an individual	1
2		Vaata- Neti	3 rounds (30 s/round)	2.5
3		Kapalbhati	3 rounds (30 s/round)	2.5
4		Deep breathing	10 rounds	3
5	Pranayama practices (16 min.)	Nadishodhana	10 rounds	8
6		Ujjaayi	10 rounds	4
7		Bhramari	10 rounds	4
8		Dhyana	Awareness of breathing, thoughts, and emotions	5
	Total			30

Table 3: Pranayama (breathing) protocol for the evening session (15 min)

Sr.No.	Name of practice	Rounds	Duration (in minutes)
1	Shavasana (corpse pose) (with palm upwards) Pristhabhumi Tadasana		1
2	Abdominal breathing	15 rounds	3
3	Thoracic breathing	15 rounds	3
4	Clavicular breathing	15 rounds	3
5	Deep breathing	15 rounds	3
6	Relaxation in Shavasana with awareness of abdominal breathing		2
	Total		15 minutes

Generally, Pranayama is advised for subjects for 30-45 minutes in the morning and evening, as shown in Tables 2 and 3. It should start with prayer, including kapalbhati, nadishodhna, Ujjaayi, and Bhramari (Figure 1,2,3,4), followed by dhyana in the morning session for 30 minutes. In the evening, relaxation in Shavasana with abdominal, thoracic, clavicular, and deep breathing practices.All of this help in strengthening muscles of respiration.

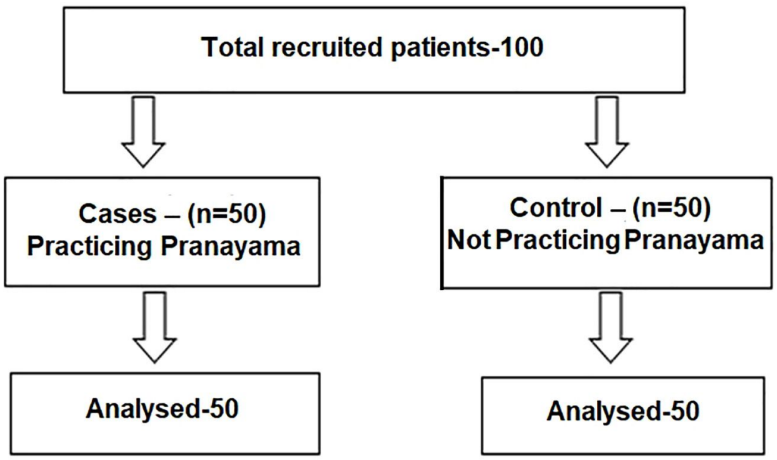
Fig 1: Kapalbhati Pranayama

Fig 2: Nadishodhana/Anulom Vilom Pranayama

Fig 3: Ujjayi Pranayam

Fig 4: Bhramari Pranayama

Flow chart showing the recruitment process of participants and design of the study



Flow chart: The recruitment process of participants and design of the study

2.10. Statistical Analysis method

Data was analyzed Statistically using descriptive and inferential statistics by applying a chi-square test, and the students were paired. SPSS 27.0 version and Graph Pad Prism 7.0 version software was used for the analysis, and the value of p for the significance level is considered $p<0.05$. The data collected was analyzed using by Chi-square statistical method.

3. RESULTS AND OBSERVATION

This cross-sectional study comprised two groups, each having 50 subjects practicing daily Pranayam and not practicing daily Pranayam from 18 to 60 years old.

Table 4: Distribution of Subjects as per their Age

Sr. No.	Group	Group A	Group B
1.	20 and below	03(6%)	00
2.	21 to 30	30(60%)	28(46%)
3.	31 to 40	05(10%)	06(12%)
4.	41 to 50	08(16%)	11(22%)
5.	51 and above	01(2%)	00
	Total	50(100%)	50(100%)

Distribution of subjects according to age showed that in Group A 03(6%) subjects were below 20 years of age, 30(60%) were between the range of 21 to 30 years, 05(10%) were between the range of 31 to 40 years, 08(16%) were between the range of 41 to 50 years and only 01(2%) was above 50 years. In group B, 28 (56%) were between the range of 21 to 30 years, 06(12%) were between the range of 31 to 40 years, and 11(22%) were between the range of 41 to 50 years.

Table 5: Distribution of Subjects as per Gender in both groups

Sr. No.	Group	Male	Female	Total
1.	Group A	21 (42.0%)	29 (58.0%)	50
2.	Group B	31 (62.0%)	19 (38.0%)	50

Distribution of Subjects as per Gender Showed that in Group A, 21 (42.0%) were males and 29 (58.0%) were females. In Group B, 31 (62.0%) were males, and 19 (38.0%) were females.

Table 6: Distribution of Subjects as per Occupation in both groups

Sr. No.	Group occupation	Group A	Group B
1.	Student	24 (48%)	25(50%)
2.	Service	22(44%)	20(40%)
3.	Business	3(6%)	5(10%)
4.	Housewife	1(2%)	0
	Total	50(100%)	50(100%)

Distribution of Subjects as per their Occupation showed that in group A24 (48%) were students, 22(44%) were engaged in service, 3(6%) were business people, and only 1(2%) was a housewife. In group B, 25 (50%) were students, 20(40%) were engaged in service, and 5(10%) were business people.

Table 7: Distribution of Pranayama performing subjects according to their RTPCR test results

	Group A Subject practicing daily Pranayama)	Group B (Subject not practicing daily Pranayam)	Chi sq	P value
RTPCR test negative	30(60.0%)	11(22.0%)	14.924	<0.01
RTPCR test positive	20(40.0%)	39(78.0%)		
Total	50	50		

Distribution of subjects in both groups according to their RT PCR test results, it was found that in Group A (Subjects practicing daily Pranayama), 30 subjects (60.0%)had negative RT PCR test and 20 subjects (40.0%) had positive RT PCR test. Whereas in Group B (Subjects not practicing daily Pranayama), 39 (78.0%) subjects had positive RT PCR tests, and 11 (22.0%) had negative RT PCR tests. Comparison of the groups was statistically significant with Chi-square (14.924) and p-value (<0.01).

Table 8: Distribution of subjects in both Groups according to the presence or absence of Symptoms in positive RT PCR

	Group A	Group B	Chi sq	P value
RT PCR Positive with symptoms	9(45%)	35(89.74%)	27.435	<0.01
RT PCR Positive but Asymptomatic	11(55%)	4(10.26%)		
Total	20	39		

The distribution of subjects according to the presence or absence of Symptoms in positive RT PCR showed that in Group A, out of 20 positive RT PCR tests, 11 (55%) were asymptomatic, and 9 (45%) subjects had symptoms. In Group B, out of 39 positive RT PCR tested subjects,4 (10.26%) were asymptomatic, and 35(89.74%)tested positive RTPC had various symptoms. Comparison of both groups was statistically significant with Chi-square (27.435), p-value (0.01)

Table 9: Distribution of subjects according to Type of Pranayama and occurrence of COVID-19 in Group A

Type of Pranayama	Total	COVID-19 Negative	COVID-19 Positive but Asymptomatic	COVID-19 Positive with Symptoms
Anulom Vilom	27(54%)	15 (55.5%)	05(18.59%)	07(25.92%)
Kapalbhati	11(22%)	05(45.45%)	04(36.36%)	02(18.18%)
Other	12(24%)	10(83.33%)	01(8.33%)	01(8.33%)
Total	50(100%)	30(60%)	10(20%)	10(20%)

In group A, out of 50 participants, 27(54%) were practicing Anulom vilom, 11(22%) were practicing Kapalbhati, and 12(24%) were practicing other types of Pranayam. Out of 27 practicing Anulom Vilom, it was found that 15 (55.5%) subjects were negative, 05(18.59%) tested positive but were Asymptomatic, and 07(25.92%) subjects were found to be positive with symptoms. Out of 11 practicing Kapalbhati, it was found that 05(45.45%) subjects were negative, 04(36.36%)tested positive but were Asymptomatic, and 02(18.18%)subjects were found to be positive with symptoms. Out of 12 practicing other types of Pranayam, it was found that 10(83.33%) subjects were negative, and 01(8.33%) of each tested positive but was Asymptomatic and was found to be positive with symptoms.

4. DISCUSSION

Human breathing is a synergistic process constantly controlled by the autonomic nervous system and may also be deliberately controlled at will, resulting in various breathing patterns [22]. Ashtanga yoga refers to the formal and conventional practice of breath control known as Pranayama, which regulates prana, or the life force.[23] By therapeutic breathing control known as Pranayama, the pulmonary reserve function, and fundamental and straightforward neurological control can be improved. Kapalbhati pranayama (KBP) (Figure no.1) is a brain detox with bellows of air in and out with inward abdominal wall contraction. In contrast, Anulom vilom pranayama (AVP)(Figure 2) is alternate nostril breathing that modulates a higher autonomic tone.[24] Diaphragmatic breathing exercises (DBE) and pursed lip breathing (PLB) are two common types of breathing exercises that aid in improving the breathing process.[25] Online interventions were delivered during the COVID-19 lockdown to lengthen breath holds at lower levels of perceived exertion.To support the pulmonary volumes and capacities measured using breath holding time (BHT) and rating of perceived exertion.[26] Anulom Vilom Pranayama (AVP), KapalBhati Pranayama (KBP), and other popular breathing exercises like Diaphragmatic Breathing Exercises (DBE) and Pursed Lip Breathing Exercises (PLBE) are investigated by Shukla M Chauhan D, Raj R. in their research study.5 According to reports, Pranayama can enhance pulmonary function [27]; therefore, these results are important as preventive measures during the COVID-19-related lockdown to reduce the lockdown's risk to one's health.[28] The results of this study are consistent with those of other studies where pranayamas[29] have been used to enhance physiological markers. There is a link between respiratory diseases and anxiety.[30] As a result of COVID-19 spreading across global communication lines, this pandemic has a mental component.[31] It causes "Coronaphobia," a recently discovered panic disorder.[32] It affects healthcare personnel; two therapies that may become recommended for this are AVP Pranayama and DBE. [33] The distribution of subjects according to age and Occupation showed no gross difference observed in the two groups. Regarding age, this study showed that the majority of the subjects were between 21-30 years; that is, the younger age group was practicing Pranayama more than the middle and old age groups (Table 4 and Table 5), demonstrating that there are more females in Group A than in Group B, from this it can be said that a greater number of women are practicing Pranayama as compared to males which might be due to men being busy and occupied in their work. It was observed that students practicing Pranayam more in both groups than subjects engaged in service and business (Table 6). This may be due to more awareness in the younger generation regarding health promotion.In Group A (Subjects practicing daily Pranayam), 60% had negative RT PCR results, and 40% had positive results. In Group B (subjects not practicing Pranayama), 78% tested positive for COVID, and 22% tested negative. The comparison of both groups was statistically significant in that Group Practicing Pranayama showed less incidence of COVID infection; this might be due to the enhancement of immunity from Pranayam. Hence, it can be said that Pranayama proved beneficial against COVID infection as subjects tested negative were significantly higher than that positive (Table 7).Distribution of subjects according to the presence or absence of Symptoms in positive RT PCR, and these showed that Pranayama was effective in preventing COVID infection because the percentage of participants who tested positive but had no symptoms, suggesting a much milder infection was substantially higher than that of subjects who came out positive with symptoms. Chi-square (27.435) and p-value (0.01) indicated a statistically significant difference between the groups. Thus, Group A showed more asymptomatic patients than Group B, which is the effect of Pranayam that helps strengthen immune power and respiratory functions (Table 8). As per the type of Pranayama, this study showed that most subjects practiced Anulom Vilom Pranayama following other types and Kapalbhati. All the types of Pranayama help prevent COVID infection and reduce its severity in Covid positive subjects ((Table no 9). Anulom-vilom pranayama was found to reduce heart rate and improve (PEFR) peak expiratory flow rate after 20 minutes of practice by Sharma Neha and Khyati Shah in an experimental study to determine the immediate effect of Anulom- Vilom Pranayama on Selected Cardiovascular and Pulmonary Parameters in Post COVID-19 Individuals. They claimed that "Anulomvilom pranayama" uses lung regions that would otherwise go unused during typical shallow breathing, aiding in improving respiratory functioning.[34] By conducting a study on 60 healthy volunteers, Dhanvijay AD et al. evaluate the effects of alternate nostril breathing (Nadi Shuddhi pranayama) for 12 weeks (in either sex). They claimed that alternate nostril breathing

improved autonomic processes. Kapalabhati Kriya is a method that involves inhaling regularly and exhaling forcefully. It facilitates diaphragm movement, relieves nasal and respiratory tract congestion, and enhances pulmonary function. The body heals more quickly when there is a high level of oxygen present. Pranayama exercises are beneficial for improving the body's ability to absorb oxygen. The healing process is amplified and accelerated by this increased oxygen intake. The study found that improving pulse substantially impacted patients with bronchial asthma's cardiorespiratory functions.[35] healthy male volunteers participated in a study by Makwana et al. that examined the effects of ten-week yoga practice on various ventilatory function test parameters. After the course's ten weeks, observations revealed improved ventilatory functions through decreased respiratory rate, increased forced vital capacity, or FEV1, maximum breathing capacity, and breath-holding time. At the same time, tidal volume and percent FEV1 showed no noticeable change. Yoga and breathing exercises appear to improve respiratory efficiency. The general function of the body is improved through Pranayama. Regular pranayama practices encourage the expansion of the chest wall and lung health. Pranayama practice strengthens the diaphragm and abdominal muscles well while strengthening the respiratory system.[36] P. Shyam Kartik et al. conducted a study on 50 first-year medical students who received yoga instruction for 30 minutes daily two months from a certified yoga instructor. Before and after yoga training, measurements of vital capacity (VC), tidal volume (TV), expiratory reserve volume (ERV), breath holding time (BHT), 40 mm endurance, and peak expiratory flow rate were recorded. They discovered a statistically significant improvement in all the previously described pulmonary functions after yoga training. The researchers concluded that yoga could be recommended to enhance lung functions in healthy people and prevent respiratory problems in the future.[37] In a Randomized Controlled Trial on the Role of Pranayama in the Rehabilitation of COPD Patients, Katiyar SK, Bihari S., et al. investigated the effects of Pranayama on COPD patients by evaluating parameters such as PFTs (Pulmonary Function Tests) and blood gasses and comparing them with the normal control group. They observed that PFT had significantly improved (Pulmonary function test).[38] A case-control study with 50 medically sound people with moderate to severe COPD was carried out by Gupta, A. et al. 25 participants in the intervention arm group received the standard medical care and training to practice Pranayam for 30 minutes each day. Twenty-five people in the control group received standard medical care without Pranayam. The body-mass index, obstruction, dyspnea, exercise (BODE) capacity index, and COPD Assessment Test (CAT) score were evaluated at baseline and after three months. The outcomes were presented using conventional statistical techniques. After three months of practice, the Interventional Group's CAT scores significantly improved, indicating that Pranayam may positively impact patients' perceptions of their health, disease severity, and functional status. They concluded that Pranayam is a helpful adjunct therapy and can be a successful COPD rehabilitation program.[39] In a 2020 randomized clinical study, Sarwal R et al. evaluated the effectiveness of Pranayama in protecting 250 frontline healthcare professionals (HCPs) from COVID-19 infection at five different COVID-19 hospitals in India. The intervention involved practicing specially created Pranayama modules twice daily for 28 days while being supervised online by yoga experts. Nine participants in the control group and one in the intervention group had COVID-19 at the end of the 28-day intervention period. The administration of twice-daily Pranayama exercises by certified yoga teachers to HCPs exposed to active cases may have aided and considerably reduced the risk of COVID-19 infection. The current study reveals that to prevent COVID-19, the pranayama modules can be spread among all demographic groups.[40] All the research above demonstrated Pranayama's respiratory strengthening, pulmonary function improvement, and immunomodulatory effects. Pranayama can be used to both treat and prevent coronavirus illness. In particular, Pranayama is essential for managing and preventing COVID-19. According to the study, pranayama modules benefit people frequently exposed to the virus as a preventative measure against COVID-19. To strengthen immunity, pranayama exercises can be encouraged and practiced. All the above research studies support the results of this study stating the association between Pranayama and the occurrence of COVID-19. Various studies explored that certain meditation, yoga asana (postures), and pranayama (breathing) practices may be effective adjunctive means of treating and preventing SARS-CoV-2 infection.[41]

5. CONCLUSION

Younger age groups, females, and students are more involved in practicing Pranayama in this study**.** Daily practice of Pranayama can be helpful in the prevention of COVID infection and in reducing the severity of the disease by enhancing the strength of the respiratory system and improving the immune system. In addition, Pranayama for at least 30 minutes each day is beneficial in preventing COVID-19, which proves the strong association between Pranayama and the occurrence of COVID-19.

6. LIMITATION

Less sample size was taken due to the limited period for the Study; more subjects can be taken for improvised results. The only association of Pranayama with COVID-19 is studied, and other Yoga practices are not included in this study.

7. ACKNOWLEDGEMENT

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8. AUTHOR'S CONTRIBUTION STATEMENT

Ms.Nikita Deulkar conceptualized the idea for conducting the study and collected data for it. Dr. Sadhana Misar Wajpeyi guided her in conducting the study and helped prepare the manuscript.

9. CONFLICT OF INTEREST

Conflict of interest declared none.

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