Research Article

IMPACT OF RESPIRATION ON STUTTERING

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ABSTRACT:

Stammering is a speech problem that causes disturbances in speech flow. It affects a person's social and professional life and creates communication difficulties. It was an observational cross-sectional study conducted from February 2023 to July 2023, to evaluate the impact of respiration on stuttering. The sample size was 343. A purposive sampling technique was employed, individuals with stammering of any severity, both gender and willing to participate were included. A self-administered structured questionnaire was used for data collection. Out of the 343 participants 55% were males and 51% of respondents were between the ages of 5 and 20 years. 62% of people had stammering for 1-5 years. Changes in their breathing patterns were reported as; faster (28%), shallower (33%), and held breaths (21%). 60% sought out interventions, highlighting the psychological effects of stammering on people. A significant percentage (34%) believed that respiratory problems were a factor in stammering. The most common factor was found to be public speaking (54%), which was followed by stress (12%). 26% of respondents reported that stammering get worse with irregular breathing and 25% reported that it gets better with deep breaths whereas 48% of respondents found no connection between the two. Conscious breathing helped 23% of participants stammer. Stammering had a substantial and moderate impact on 49% and 32% individuals' quality of life. 34% have reported that stammering was alleviated by addressing breathing patterns, 38% reported it to be of somewhat help, and for 25% it did not make a difference. Coexisting respiratory or speech-related symptoms were reported by 42% of respondents. This study highlights the relationship between breathing and stammering, highlighting the necessity of tailored therapies that target speech and breathing patterns for comprehensive care. The results provide important new information on the causes of stammering and possible therapeutic options for those who experience it.

Keywords: Stammering, Respiration, Breathing patterns, Quality of life

INTRODUCTION

Stuttering is a speech disorder characterized by sporadic difficulties in producing a smooth stream of speech. It typically emerges a year or two after a child learns to speak, starting with word fragment repetitions that may progress to longer hesitations, speech blockages, and sound prolongations over time. While "stalling" is used in Europe to describe tense speech blockages, in America, "stuttering" is the preferred term for all variations of the disorder. The term "stuttering" is currently preferred in this notion to describe all variations of the disorder (1). Stammering which is also known as stuttering is a speech disorder characterized by disruptions in the normal flow of speech, including repetitions of sounds or words, prolongations of sounds, or blocks in the production of speech sounds. These disruptions can lead to communication difficulties and negative social consequences, and may cause significant distress and frustration for individuals who stammer. Stammering is a complex and multifaceted disorder that can have a significant impact on an individual's life (2).

Stuttering is a speech disorder characterized by disruptions in the fluency of speech, such as repetitions, prolongations, and blocks of sounds or syllables. Stuttering can vary in severity and may occur in different speech situations, such as when speaking in front of others, on the telephone, or during a job interview. Additionally, stuttering can have an emotional impact on the speaker, such as anxiety, frustration, or embarrassment but the exact causes of stuttering are not fully understood (3). Stammering is a communication disorder characterized by involuntary disruptions in the rhythm and fluency of speech. Some common symptoms of stammering include repetitions of sounds, syllables, or words, prolongations of sounds, blocking or hesitations before speaking, and

interjections such as "um" or "ah" (4). These symptoms often result in the speaker feeling self-conscious, embarrassed, or frustrated, which can further exacerbate the stammering. Stammering may also be accompanied by physical tension, such as eye blinking or facial grimacing. The severity of stammering can vary widely among individuals, ranging from mild to severe, and can also fluctuate over time or in different contexts. Stammering can affect not only the speaker but also their communication partners, who may experience anxiety or uncertainty about how to respond (5).

Stuttering shows primary and secondary symptoms. Primary symptoms of stuttering include repetitions of sounds, syllables, or words, prolongations of sounds, and blocks, which are silences or pauses during speech. Secondary symptoms, also known as "escape" behaviors, may develop as a result of the primary symptoms and include eye blinks, head nods, foot tapping, and other physical movements that individuals with stuttering may use to try to release tension or "escape" the block (6). Additionally, individuals with stuttering may experience negative emotions and attitudes related to their speech, including shame, anxiety, and avoidance of certain speaking situations. These emotional and cognitive reactions can further exacerbate the primary and secondary symptoms of stuttering, creating a cycle of frustration and anxiety (7).

In a study on preschool-aged children, differences in respiratory sinus arrhythmia (RSA) were examined among those with persistent stuttering, those who recovered, and non-stuttering children. Baseline RSA was similar across groups. During emotionally charged video clips, the non-stuttering group had higher RSA in positive conditions, while the recovered group had lower RSA(8). In storytelling tasks, the persistent group exhibited a higher RSA difference between baseline and post-positive/negative tasks compared to the non-stuttering group. Follow-up analysis showed higher RSA in the baseline condition for the recovered and non-stuttering groups compared to the persistent group. The study concluded that results gave an understanding of how emotions function physiologically in children who stutter and persist as well as children who stammer and recover(9).

In a study on long-term COVID-19 consequences, two patients with SARS-CoV-2 infection developed neurogenic stuttering. Both experienced cognitive and physical issues, including fatigue, affecting attention and word retrieval. Speech disfluencies resembling stuttering, accompanied by effortful motions emerged. Neurophysiological assessments revealed slowed brain activity, aligning with neuropsychological difficulties. After negative SARS-CoV-2 tests, neurogenic stuttering and cognitive impairments persisted for 4-5 months before gradual improvement. The study suggests that SARS-CoV-2 may significantly impact the central nervous system, leading to prolonged neurogenic stuttering linked to slowed brain metabolism in specific regions. As a result, theories on the pathophysiological mechanisms underlying the emergence of neurogenic stuttering have been developed, which contributes to a better understanding of the potential neurological effects of COVID-19(10).

A study reported in 2022 including 498 children aged 9-17 years aimed to identify prevalent speech impairments in mouth breathers (MB) and analyze related factors. MB was linked to orofacial myofunctional disorders, allergic rhinitis, adenoid hypertrophy, and functional mouth breathing. Allergic rhinitis was the most common etiology, followed by functional mouth breathing. 81.7% of children experienced speech difficulties, though more prevalent in males. Stuttering (19.2%) and frontal lisp (36.1%) were notable, with 10.6% having multiple speech impairments. A significant correlation existed between etiology, orofacial myofunctional disorders, and speech abnormalities. The study concluded that MB children frequently faced articulation problems, and malocclusion showed a statistically significant link to speech issues. In order to mitigate the negative consequences of MB and enhance people's overall development, it emphasizes the importance of interdisciplinary monitoring of MB kids (11).

In a study on acquired neurogenic stuttering (ANS), the effectiveness of diaphragmatic breathing, commonly used for developmental stuttering (DS), was explored. DS is a lifelong stuttering disorder beginning in childhood, while ANS arises suddenly in adults post-brain injury. Unlike DS, there are limited treatment options for ANS. This single-subject case study aimed to determine if diaphragmatic deep breathing enhances fluency in ANS individuals. The one-month therapy process included both a home program and in-person treatment. The

participant's primary stuttering behaviors appeared to have decreased, but further study is needed to evaluate whether these results would hold true for a larger sample size (12).

In a longitudinal study on Parkinson's disease (PD) impact on speech, eight PD patients were compared with control participants, assessed at two points, around three years apart. The study aimed to explore the effects of PD on breath pauses and grammatical errors and their contribution to speech impairment. Results showed that, over the time, individuals with PD produced more breath pauses without punctuation and fewer at major syntactic borders. PD participants consistently had more disfluencies than the control group. The severity of speech impairment was linked to the number of mazes and the percentage of breath pauses without punctuation, explaining 50% of the variance. The study findings emphasized that the significance of improving speech output in PD patients by targeting both respiratory physiology and cognitive-linguistic systems (13). This study was design to evaluate impact of breathing on stammer.

METHODS:

The study was observational cross-sectional, the data was collected from various healthcare settings, including The University of Lahore (UOL) Teaching Hospital, Sehat Medical Complex, DHQ Sheikhupura, Badar Hospital and Khadija Clinic, Lahore Pakistan. Data was collected from patients who visit these medical facilities and was gathered during the course of the study's six-month duration from February 2023- July 2023. Sample size calculated for this study was 343 where the prevalence (p) of stammering was taken as 0.90%. Level of confidence (z) was taken as 1.00 and the value of precision (D) was taken as 2.534.

Purposive sampling technique was used in this study. Individuals diagnosed with stammering (or self-reported stammering) of any severity, both males and females, willing to participate and provided informed consent were included. Whereas Individuals with a history of neurological disorders affecting speech production such as those with history of stroke, traumatic brain injury, any other co-existing speech or language disorders unrelated to stammering, Inability to understand or complete the questionnaire due to cognitive impairment or language barriers were excluded from the study.

A self-administrated structured questionnaire specifically designed to gather data on the association of stammering with respiration. The questionnaire was developed through literature review and expert opinion. Ethical considerations were upheld throughout the development and use of the questionnaire, with participants providing informed consent and their confidentiality being strictly maintained. The questionnaire served as a valuable tool in this research study enabling the collection of data necessary to explore the association of stammering with respiration and contributing to a deeper understanding of the topic.

The data collection procedure for this research project involved the administration of a questionnaire designed to investigate the impact of respiration on stuttering. The questionnaire consisted of a series of carefully constructed questions, including demographic information, inquiries about stammering experiences, breathing pattern observations, and participants' perceptions of the relationship between their breathing and stammering symptoms. Participants were provided with clear instructions on how to complete the questionnaire and were assured of the confidentiality and anonymity of their responses. They were also required to provide informed consent before proceeding with the questionnaire. Participants were given sufficient time to respond to each question thoughtfully. Once the questionnaires were collected, the data was compiled and organized for analysis. The Statistical Package for Social Sciences (SPSS) version 22.0 was used to analyze the data.

Statistical analysis

The data was analyzed using Statistical Package for Social Sciences (IBM SPSS version 26.0). Chi-square tests were used with a p-value <0.05 was considered significant.

RESULTS:

The majority of respondents were aged between 5 and 40 years, with 51% falling within 5-20 years, 33% within 20-40 years, and 16% above 40 years old. There were 55% males and 45% were females.

Regarding stammering duration, 62% have experienced it for 1-5 years, 24% for less than a year, 11% for 5-10 years, and 3% for over 10 years. Breathing pattern changes were common among those who stammer, with 28% reporting faster breathing, 33% shallow breathing, 21% breath-holding tendencies, and 18% noticing no change.

Professional help is sought by 60% for managing stammering, highlighting its significance. 34% strongly believed that breathing contributes in stammering, 37% see some connection, 21% did not see a link, and 8% were unsure. Public speaking triggers stammering for 54%, followed by authority figures (16%), stress (12%), and phone conversations (7%).

Irregular breathing worsens it in 26% of participants, while deep breathing improved it for 25%. However, 48% observed no correlation. Around 42% were unaware of their breathing during stammering, and 23% find conscious breathing beneficial, while 3% find it detrimental.

Stammering affected quality of life significantly in 49% of participants, moderately for 32%, minimally for 5%, and not at all for 14%. Breathing exercises are tried by 40% for management. A method was reported effective by 60%, ineffective by 37%, and other outcomes by 3%. A total of 28% underwent therapy for stammering.

Addressing breathing patterns was believed to alleviate stammering by 34%, somewhat help by 38%, and not making a difference in 25%, while 3% were unsure. Coexisting respiratory or speech-related symptoms were reported by 42% of respondents.

Table 1. Summary of the response of the participants presenting with stammering

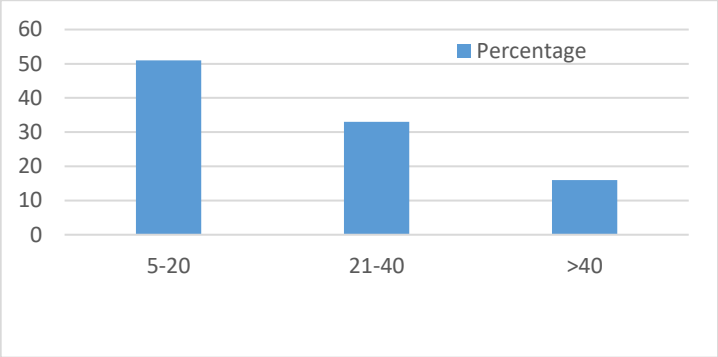

Figure 1. Age groups of the participants presenting with stammering

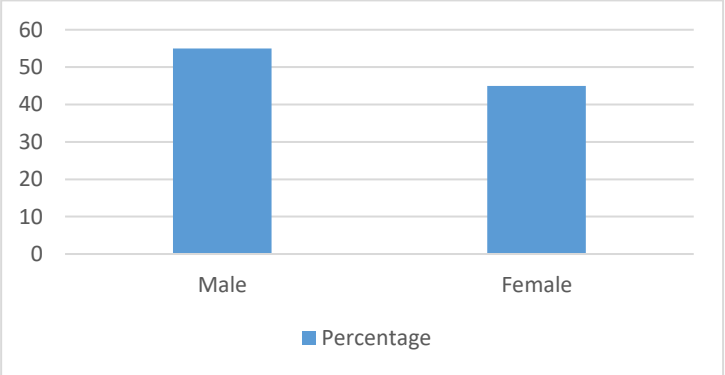

Figure 2. Gender distribution of the participants presenting with stammering

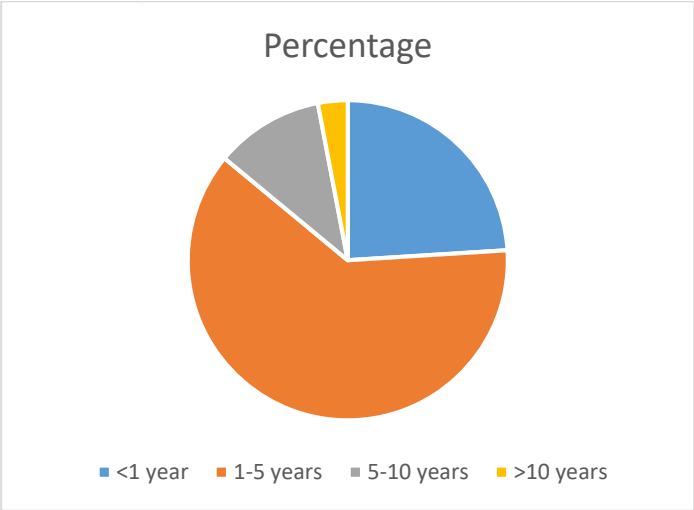

Figure 3. How long have you been experiencing stammering?

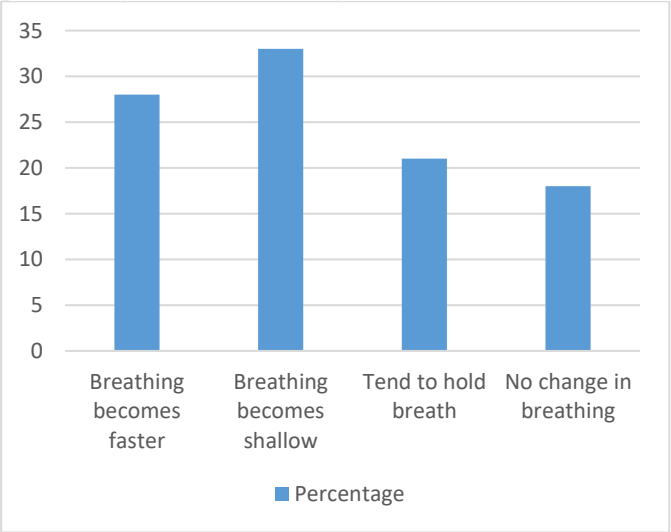

Figure 4. Do you notice any change in your breathing pattern when you stammer?

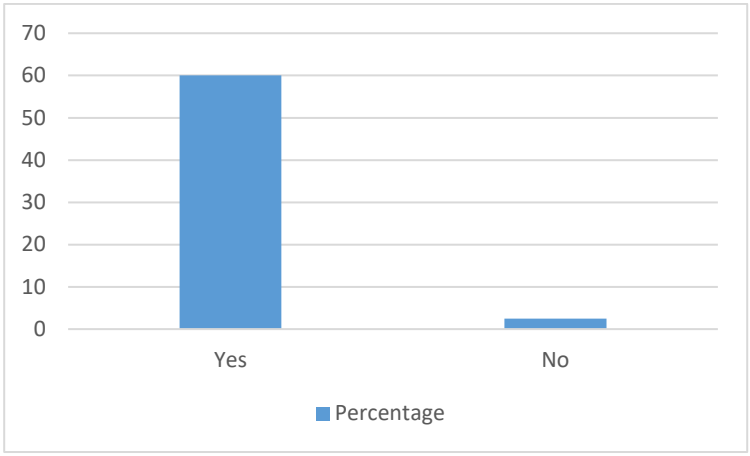

Figure 5. Have you sought any medical or therapeutic interventions to manage your stammering

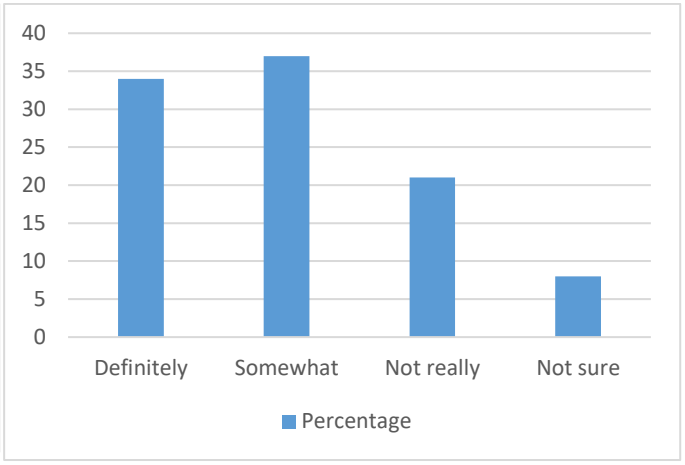

Figure 6. Do you feel that your breathing difficulties contribute to the occurrence or exacerbation of your stammering?

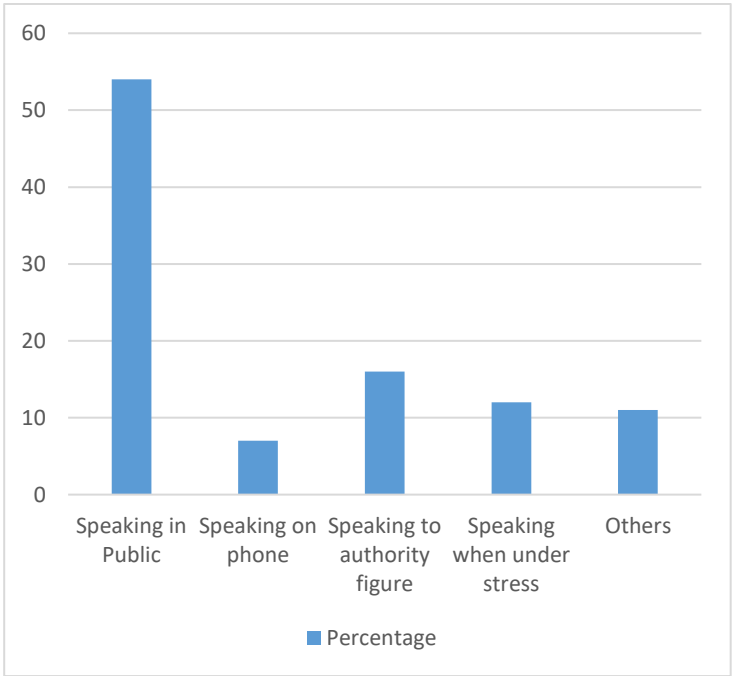

Figure 7. Are there any specific situations or triggers that make your stammering worse? If so, please select the relevant options:

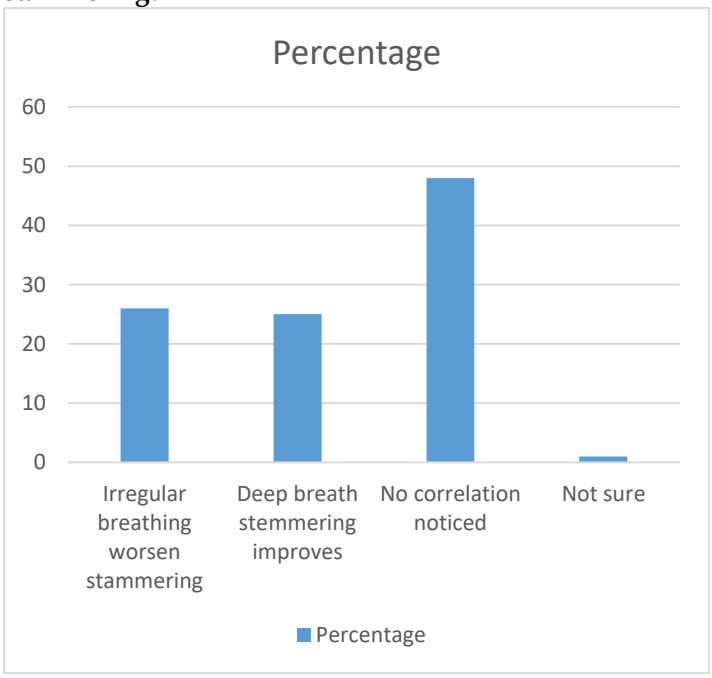

Figure 8. Have you noticed any correlation between your breathing patterns and the severity of your stammering?

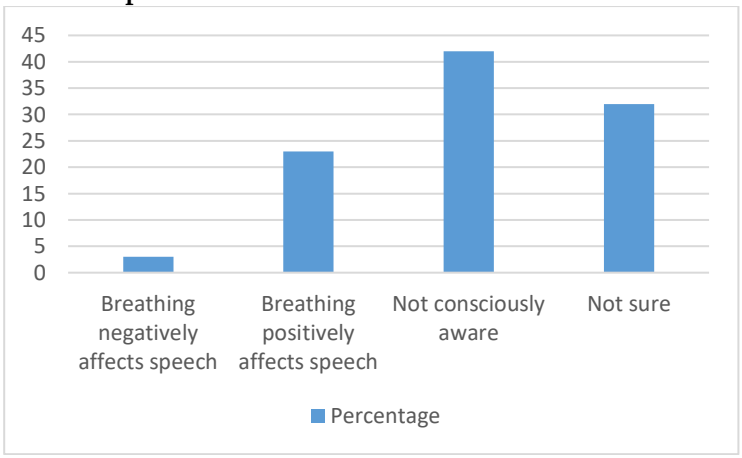

Figure 9. Are you consciously aware of your breathing when you stammer? Does it affect your speech in any way?

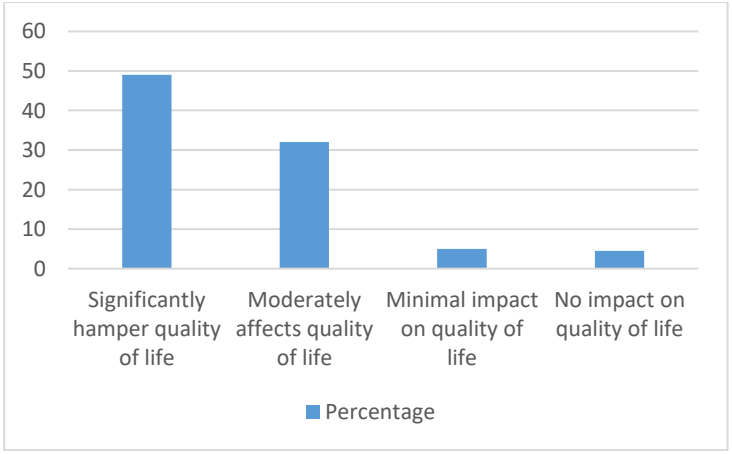

Figure 10. How does stammering affect your overall quality of life, including social interactions, professional opportunities, etc.?

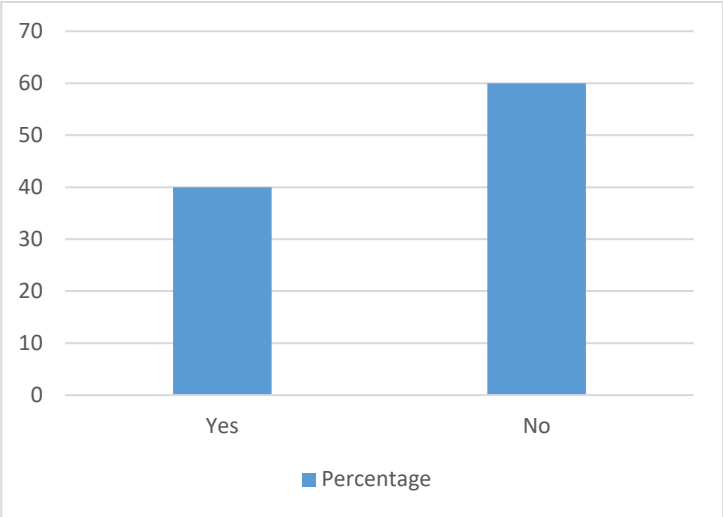

Figure 11. Have you tried any breathing exercises or techniques to manage your stammering?

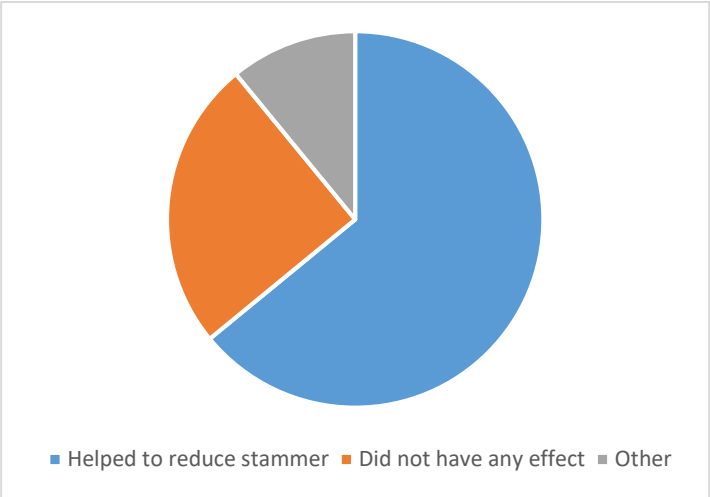

Figure 12. If yes, what were the results?

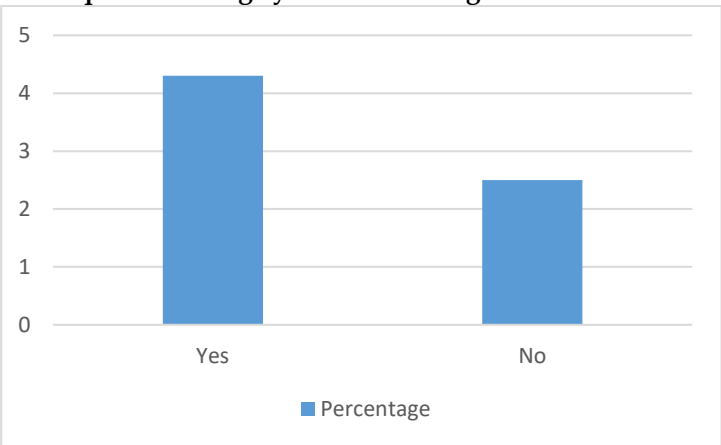

Figure 13. Are you currently receiving any therapy or treatment to address your stammering?

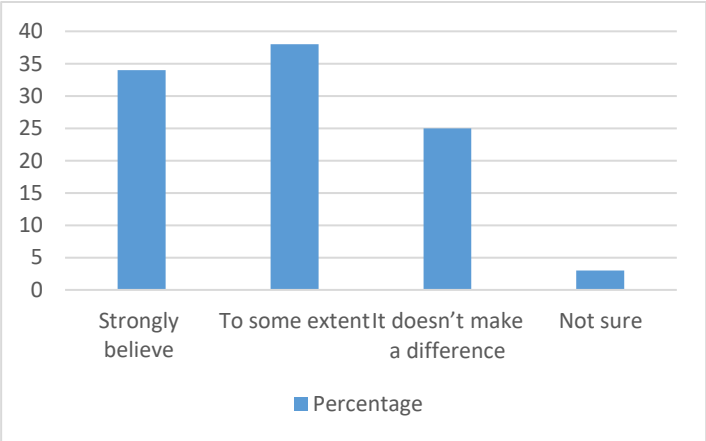

Figure 14. Do you believe that addressing your breathing patterns can help alleviate your stammering symptoms?

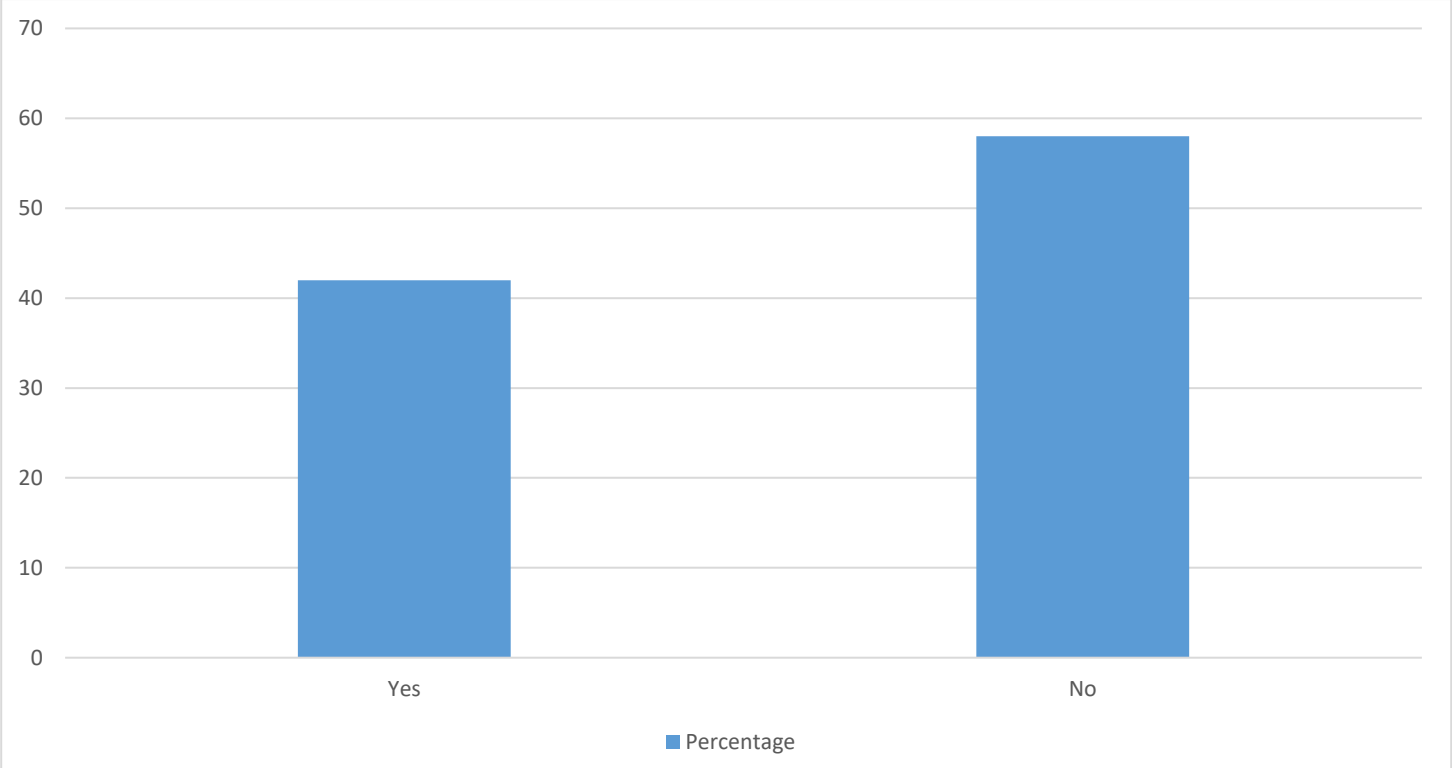

Figure 15. Are there any other respiratory or speech-related symptoms or conditions you have experienced alongside stammering?

DISCUSSION

In 2019 study titled "Monitoring of Respiratory Patterns and Bio-signals during Speech from Adults Who Stutter and Do Not Stutter," researchers observed that during instances of stuttered speech, known as blocks, individuals who stutter showed an increased number of expiratory volume peaks (breathing out) and higher amplitude (intensity) in their exhalations. This suggests that individuals who stutter tend to have more pronounced and intense exhalations while stuttering compared to fluent speech (14).

Similarly, in this study a significant percentage of individuals who stammer reported experiencing changes in their breathing pattern, 28% reported faster breathing. However, it is worth noting that a notable portion of respondents, about 18%, did not notice any discernible change in their breathing pattern while experiencing stammering.

In a study reported in 2018 that incorporating various speech-related respiratory behaviors during therapy for stuttering youngsters resulted in significant enhancements in speech fluency. Notably, participants who adopted nasal inhalation techniques showed particularly positive outcomes, with 29 subjects achieving fluent speech by the end of the therapy course. The study suggests that implementing specific breathing methods during stuttering therapy can lead to substantial and lasting improvements in fluency, with minimal occurrences of stuttering episodes during the follow-up period (12).

Similarly, in this study, most of the participants (34%) strongly believed that addressing breathing patterns can be highly beneficial in reducing stammering symptoms, while an additional 38% expressed the belief that it could still be somewhat effective.

There were some limitations of the study, small sample size has hindered robust conclusions and generalization to the population. Time constraints restricted thorough exploration. Narrow focus overlooked crucial factors and hindered a comprehensive understanding of the topic.

It is recommended to incorporate breathing techniques in speech therapy to improve speech fluency, develop personalized treatment plans for individuals who stammer, considering specific breathing patterns and triggers, raise awareness among individuals and families about the impact of breathing on stammering and conduct further research to better understand the relationship between respiration and stammering for more effective treatments.

CONCLUSION

In conclusion, overall, the study revealed the importance of addressing breathing patterns and their potential impact on stammering. Many individuals acknowledged the significance of these patterns in managing their condition. Additionally, the investigation highlighted the role of therapy or interventions in mitigating stammering symptoms and improving individuals' quality of life.

Conflict of Interest

Authors declare no conflict of interest

Ethical consideration

The study was approved by the Ethical Review Committee of Dow University of Health Sciences, Karachi, Pakistan.

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