

## Original Research Article

# Strategies to cope claustrophobia during magnetic resonance imaging examination

Syed Amir Raza Zaidi<sup>1</sup>, Kamran Masood<sup>1</sup>, Usman Khanzada<sup>1</sup>,  
Syed Omair Adil<sup>2\*</sup>, Munawar Hussain<sup>1</sup>

<sup>1</sup>Department of Radiology, <sup>2</sup>Department of Research, Dow University of Health Sciences, Karachi, Pakistan

**Received:** 20 January 2019

**Accepted:** 01 March 2019

### \*Correspondence:

Mr. Syed Omair Adil,

E-mail: [Omair.adil@duhs.edu.pk](mailto:Omair.adil@duhs.edu.pk)

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

### ABSTRACT

**Background:** Claustrophobia associated with MRI scan is a well-recognized problem all over the world. The unpleasant psychological experience during MRI can lead to premature cancellation of the study resulting in non-interpretable data. In addition, performing future studies on the claustrophobic patient may not be possible leading to non-utilization of an important diagnostic modality. This study was conducted with the aim to determine a cheap and short intervention which can be applicable to small radiology set up as well.

**Methods:** A prospective study was conducted at a tertiary care hospital from October 2016 to December 2016. Accompanying someone was the first strategy used to cope MR imaging claustrophobia followed by placebo (multivitamin), listening Quran and closed eye (blindfold). All those patients who failed to respond in these strategies were finally labeled as an unsuccessful candidate. Listening of Quran was selected as one of the tools as all the patients were Muslims in present study.

**Results:** Among 84 claustrophobic patients, a closed eye was the most successful strategy found effective in (13) 81.2%, followed by placebo 66.7% patients, listening Quran (7) 30.4%, accompanying someone (15) 17.85% while 4% patients remained claustrophobic after application of all strategies. Significant association of accompanying someone and placebo was observed with education (p-value 0.037) and age of the patients (0.016) respectively.

**Conclusions:** In general, placebo, being accompanied by someone and blindfold were found to be the most effective strategies to cope with MRI related claustrophobia. However, the success of these strategies is also dependent on certain factors like age, education status and socioeconomic status of the patients.

**Keywords:** Blindfold, Claustrophobia, MRI scan, Test taking strategies, Short intervention, Success

### INTRODUCTION

Magnetic resonance (MR) imaging is gaining popularity as an important diagnostic tool and is considered the top medical inventions of the last 25 years.<sup>1</sup> MRI is used for creating images of different body organs and structures. For this scan, the patient is placed in the center of a large magnet for a considerable period of time in order to optimize the quality of scan.<sup>2</sup> Although, MRI is a relatively safe procedure, the patients may go through significant

anxiety or claustrophobia from having to lie down in a confined space for prolonged periods of time.<sup>3</sup> It has been observed that due to MRI claustrophobia approximately 2 million scans cannot be performed worldwide every year. This causes significant economic burden.<sup>4</sup>

Many associated factors may contribute to MRI associated claustrophobia. For instance, during the procedure, MRI machine produces radiofrequency pulses, which make large sounds within the machine. Moreover, patients have

frequently described their feelings during scan as if they were buried alive or left alone to die.<sup>5,6</sup> This anxiety and claustrophobia can markedly compromise effectiveness of the scan to the extent it may lead to premature termination of the entire procedure.<sup>2,7</sup>

The unpleasant psychological experience during MRI can lead to premature cancellation of the study resulting in non-interpretable data. Previous studies on coping strategies for MRI related claustrophobia focused on behavioral interventions. However, more recently attention has directed towards role of cognitions.<sup>2,8</sup> Although partial sedation and other anxiolytic methods were describing as successful tools in previous studies.<sup>9,10</sup> The current study was planned to determine a cheap and effective method to cope with MRI related claustrophobia which can be applicable across small and large radiology departments.

## **METHODS**

### ***Study population***

This study was conducted at tertiary care hospital from November 2016 to December 2016. All patients were recruited through non-probability consecutive sampling.

### ***Inclusion criteria***

The inclusion criteria were all patients of either gender with age of more than equal to 18 years who reported MRI related claustrophobia.

### ***Exclusion criteria***

- Mentally retarded or Cerebral Palsy patients,
- And those having MR imaging done under any sedation or anesthesia and
- Patients with general contraindication to MR imaging.

Patients were labeled as MRI claustrophobia when they either refused to be placed inside the MRI machine before the start of the study despite routine counseling or patients requested to terminate the scan due to claustrophobia after the start of initial sequences.

### ***Ethical consideration***

Ethical approval was taken from Institutional Review Board of (IRB) of the institute. Moreover, signed informed consent was also taken prior inclusion of the participant in the study.

### ***Data collection procedure***

All claustrophobic patients were counseled by the MR imaging technologist regarding the importance of completing the MR imaging and various techniques to overcome the anxiety and claustrophobia. We recorded the number of MRI cancellation and premature termination due to claustrophobia during this period and compared the

outcomes of patients who used our various coping strategies and evaluated the results for best compliance. On all patients, following strategies were tested in descending order. Next step was adopted only after the failure of previous strategy. Accompanying someone was the first strategy used followed by administration of placebo, then listening to verses from Quran and lastly the blind fold was placed. All those patients who failed to respond in these strategies were finally labeled as unsuccessful candidate. Listening of Quran was selected as one of the tools as all the patients were Muslims in present study and in situations of anxiety most of our patients usually started to pray. This information along with patient demographics such as age, gender, education, total monthly household income, residence, marital status and employment status was recorded.

### ***Statistical analysis***

Data were entered and analyzed using statistical package for social sciences (SPSS) version 20. Descriptive analysis was explored using mean and standard deviation for quantitative variables and frequency and proportions for qualitative variables. Chi-square test and Kruskal Wallis test was used to see the difference of strategies use to coped MR imaging claustrophobia and general characteristics. P-value <0.05 was taken as significant.

## **RESULTS**

Out of total 84 patients with MRI related claustrophobia, majority of the patients 55 (65.5%) were females and 29 (34.5%) were males [median age: 41(34-49)]. There were 53 (63.1%) patients with less than 12 years of education (Table 1).

The first strategy used to manage MRI related claustrophobia was being accompanied by someone. This was effective in (15/84) 17.85% patients. Remaining 69 patients were given placebo which is was successful in 46 (66.7%). The remaining 23 patients listened to recitation of Holy Quran, which was successful in 7 (30.4%) patients. The last strategy was placement of blindfold which was found effective in 13 out of 16 patient (81.2%) patients. Out of total 84 patients 3 (4%) remained claustrophobic despite application of all strategies (Figure 1).

Further analysis of various of various subgroups revealed that being accompanied by someone was the most successful strategy among unmarried patients 3 (33%) followed by patients from rural residence 6 (24%) and those having less than 12 years of education 13 (24%). Administration of Placebo was the most successful strategy among patients with more than 12 years of education 20 (69%).

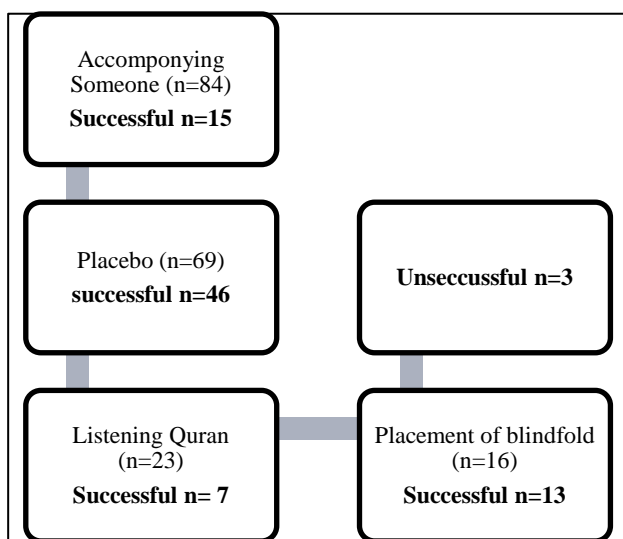
Listening to recitation of Quran was successful amongst unemployed patients 2 (12%) and those with urban residence 2 (12%). Placement of blindfold was most effective in patients having rural residence 6 (24%) and

amongst housewives 8 (24%) (Table 2). There was statistically significant association between being accompanied by someone and educational status (p-value 0.037) and the between the administration of placebo and age (0.016) were found to be significantly associated.

**Table 1: General characteristics of the patients (n=84).**

Variables	n	%
<b>Age (in years)</b>	41 (34-49) <sup>†</sup>	
≤40	36	42.9
>40	48	57.1
<b>Gender</b>		
Male	29	34.5
Female	55	65.5
<b>Years of education</b>	12 (12-15) <sup>†</sup>	
≤12	53	63.1
>12	31	36.9
Total monthly household income* (in PKR)	31,000 (30,250-34,000) <sup>†</sup>	
≤25,000	18	21.4
>25,000	66	78.6
<b>Residence</b>		
Urban	59	70.2
Rural	25	29.8
<b>Marital status</b>		
Unmarried	9	10.7
Married	75	89.3
<b>Employment status</b>		
Employed	33	39.3
Unemployed	19	22.6
Housewife	32	38.1

n: number, \*PKR: Pakistani Rupees; †median (IQR)



**Figure 1: Flow diagram of strategies used to manage MRI claustrophobia.**

**DISCUSSION**

Present study showed that administration of placebo was the most successful strategy used to cope with MR related claustrophobia, followed by being accompanied by someone and placement of blindfold. The high rate of success with administration of placebo medication may be related to the fact that most patients believe that there is a pill or medicine for every condition.<sup>11,12</sup> This belief may have led to the success of this strategy. The second most successful strategy was found to be being accompanied by someone in which case a relative or friend was present alongside the patient during the course of complete MRI scan. This usually increases the level of comfort amongst the patients knowing that someone familiar is nearby to help in case of any emergency.

In order, to assess the role of spiritual means to overcome MRI related claustrophobia some of the patients, with their consent listened to few verses from the Holy Quran, it was found to be effective in most of the patients with lower socioeconomic status. The recitation of Holy Quran was in the traditional Arabic Language which is not very well understood by most of the patients which may have resulted in decreased rate of success whereas, previous studies conducted using various musical tunes have shown increased rate of success.<sup>13,14</sup>

Lastly, the third most successful strategy was placement of the blindfold which resulted in the patient being less aware of their surrounding including the MRI magnet bore in which they were placed. This made it easy for them to complete the scan without any fear.

In our study, MRI related claustrophobia was higher amongst females as compared to males. Moreover, older age patients (>40 years age) were also more likely to experience MRI related claustrophobia. A study by Sarji et al, also reported similar findings in older age patients.<sup>15</sup> However, in contrast to these fore mentioned, Wollman et al, has reported no discomfort in older age patients.<sup>16</sup>

Of the entire study population, only three patients were unable to complete the MRI scan despite of application of all coping strategies to overcome MR related claustrophobia. All of them were from the older age group having urban residence. Two of which were female housewives while one patient was an unemployed married male of 60 years of age. These findings contrast with several previous studies which reported high MRI imaging tolerance and lower prevalence of MRI related claustrophobia in older patients.<sup>16,17</sup> As our sample did not contain adequate number of patients in the older age group, therefore, this finding needs to be further studied using a higher sample in the older age group. A study has reported that the use of multiple strategies to cope with MRI related claustrophobia may lead to further anxiety and thus resulting in failure to cope with MRI related claustrophobia.<sup>18</sup>

Apart from one patient in our study who was an 81 years old male of rural residence, the ages of all patients were in between 20-60 years. MRI related claustrophobia of this

patient was successfully dealt with the administration of placebo.

**Table 3: Comparison of successful strategies with general characteristics of the patients (n=84).**

Variables	N	Being accompanied by someone (n=15)	Placebo (n=46)	Listening Quran (n=7)	Placement of blindfold (n=13)	Unsuccessful (n=3)	
Age (in years)	≤40	36	7 (19)	22 (61)	3 (8)	4 (11)	0 (0)
	>40	48	8 (17)	24 (50)	4 (8)	9 (19)	3 (6)
Gender	Male	29	4 (14)	16 (55)	3 (10)	5 (17)	1 (3)
	Female	55	11 (20)	30 (54)	4 (7)	8 (14)	2 (4)
Years of education	≤12	55	13 (24)	26 (47)	4 (7)	10 (18)	2 (4)
	>12	29	2 (7)	20 (69)	3 (10)	3 (10)	1 (3)
Total monthly household income*	≤25,000	18	4 (22)	8 (44)	2 (11)	4 (22)	0 (0)
	>25,000	66	11 (17)	38 (58)	5 (8)	9 (14)	3 (4)
Residence	Urban	59	9 (15)	33 (56)	7 (12)	7 (12)	3 (5)
	Rural	25	6 (24)	13 (52)	0 (0)	6 (24)	0 (0)
Marital status	Unmarried	9	3 (33)	6 (67)	0 (0)	0 (0)	0 (0)
	Married	75	12 (16)	40 (53)	7 (9)	13 (17)	3 (4)
Employment status	Employed	33	6 (18)	20 (61)	3 (9)	4 (12)	0 (0)
	Unemployed	17	3 (18)	10 (59)	2 (12)	1 (6)	1 (6)
	Housewife	34	6 (18)	16 (47)	2 (6)	8 (24)	2 (6)

All data presented as number (%), \*Total monthly household income was measured in Pakistani Rupees

The findings of this study could be observed in light of the limitations that majority of similar studies have determined the anxiety level in MRI claustrophobia patients using with MRI related claustrophobia but we did not measure the find out the anxiety level of the patients. Moreover, present study also could not determine the underlying cause of MR imaging claustrophobia. As we have used a step wise towards implementing the strategies this may have given significant disadvantage to those strategies which were lower down our list. In spite of these limitations, this study is the first attempt to overcome MR related claustrophobia in the Pakistani population. Further multicenter studies are recommended to generate more local data so that algorithms specific to the Pakistani patient population could be developed. These will eventually help in improvement of MRI experience for individual patients, better compliance during the MRI scan and also generate better quality images.

## CONCLUSION

In general, administration of placebo followed by being accompanied with someone and placement of blindfold were found to be the most effective strategies. However, success of these strategies is also dependent on certain factors like age, educational status and socioeconomic status of the patient. These simple strategies can be applied

without significant expense and have no major ethical considerations.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

## REFERENCES

- Lohrke J, Frenzel T, Endrikat J, Alves FC, Grist TM, Law M, et al. 25 Years of Contrast-Enhanced MRI: Developments, Current Challenges and Future Perspectives. *Adv Ther.* 2016 Jan;33(1):1-28.
- Thorpea, Susan, Paul M Salkovskisb, and Antonia Dittnerb. "Claustrophobia in MRI: the role of cognitions." *Magn Reson Imaging.* 2008:1081.
- Mühlberger A, Herrmann MJ, Wiedemann GC, Ellgring H, Pauli P. Repeated exposure of flight phobics to flights in virtual reality. *Behav Res Ther.* 2001 Sep;39(9):1033-50.
- Munn Z, Moola S, Lisy K, Riitano D, Murphy F. Claustrophobia in magnetic resonance imaging: A systematic review and meta-analysis. *Radiography.* 2015 May 1;21(2):e59-63.
- Tazegul G, Etcioğlu E, Yildiz F, Yildiz R, Tuney D. Can MRI related patient anxiety be prevented?. *Magn Reson Imaging.* 2015 Jan 1;33(1):180-3.

6. Katz RC, Wilson L, Frazer N. Anxiety and its determinants in patients undergoing magnetic-resonance-imaging. *J Behav Ther Exp Psychiatry.* 1994;25(2):131-4.
7. McGlynn FD, Smitherman TA, Hammel JC, Lazarte AA. Component fears of claustrophobia associated with mock magnetic resonance imaging. *J Anxiety Dis.* 2007 Jan 1;21(3):367-80.
8. Rachman S, Levitt K, Lopatka C. Panic: The links between cognitions and bodily symptoms-I. *Behav Res Ther.* 1987 Jan 1;25(5):411-23.
9. Murphy KJ, Brunberg JA. Adult claustrophobia, anxiety and sedation in MRI. *Magn Reson Imaging.* 1997 Jan 1;15(1):51-4.
10. Eshed I, Althoff CE, Hamm B, Hermann KG. Claustrophobia and Premature Termination of Magnetic Resonance Imaging Examinations. *J Magn Reson Imaging.* 2007 Aug;26(2):401-4.
11. Busfield J. A pill for every ill explaining the expansion in medicine use. *Soc Sci Med.* 2010 Mar;70(6):934-41.
12. Triggler DJ. Treating desires not diseases: a pill for every ill and an ill for every pill? *Drug Discov Today.* 2007 Feb;12(3-4):161-6.
13. Walworth DD. Effect of live music therapy for patients undergoing magnetic resonance imaging. *J Music Therapy.* 2010 Dec 1;47(4):335-50.
14. Simpson S. The effects of self-selected music on anxiety levels and movement of patients undergoing magnetic resonance imaging, part II. *Images.* 2000;19(2):10-6.
15. Wollman DE, Beerli MS, Weinberger M, Cheng H, Silverman JM, Prohovnik I. Tolerance of MRI procedures by the oldest old. *Magn Reson Imaging.* 2004;22:1299-304.
16. Sarji SA, Abdullah BJ, Kumar G, Tan AH, Narayanan P. Failed magnetic resonance imaging examinations due to claustrophobia. *Australas Radiol.* 1998 Nov;42(4):293-5.
17. Eshed I, Althoff CE, Hamm B, Hermann KG. Claustrophobia and premature termination of magnetic resonance imaging examinations. *J Magn Reson Imaging.* 2007 Aug; 26(2):401-4.
18. Thorpe S, Salkovskis PM, Dittner A. Claustrophobia in MRI: the role of cognitions. *Magn Reson Imaging.* 2008 Oct 31;26(8):1081-8.

**Cite this article as:** Zaidi SAR, Masood K, Khanzada U, Adil SO, Hussain M. Strategies to cope claustrophobia during magnetic resonance imaging examination. *Int J Res Med Sci* 2019;7:1166-70.