Effect of a multisensory integration intervention on policewomen with migraine

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ABSTRACT

Background: Multisensory integration is used for people who are having migraine attacks. When multisensory functions such as visual and auditory stimulation are applied, the level of migraine triggers and attacks decreases gradually.

Objectives: The study aimed to determine the effect of multisensory integration intervention on policewomen with migraine.

Materials and methods: The study is based on a quasi-experimental study with 30 policewomen (15 in the experimental group and 15 in the control group) aged between 20 and 60. The MIDAS (Migraine Disability Assessment Scale) was used to measure the migraine level among policewomen.

Results: There is a significant reduction in migraine levels among female police officers. The data shows that the pre-test and post-test scores of both experimental and control groups were significantly different. Since the *p* value is lesser than 0.05, alternate hypothesis is accepted. Hence, there is a statistically significant difference in post-test scores between experimental and control group. This suggests that the intervention received by the experimental group had greater improvement when compared to the control group.

Conclusion: Multisensory integration has a significant effect on reducing migraines among female police officers. This study's benefit is to reduce the impact of migraines on individuals through multisensory integration-based activities.

Introduction

Migraine is derived from the Greek word 'Hemikrania', later converted into Latin as "hemigranea". A migraine is a headache that causes severe throbbing pain or a pushing sensation, usually on one side of the head.[1] Migraine attacks are frequently accompanied by nausea, vomiting, and a heightened sensitivity to light and sound. They can persist for hours or even days, and the pain can be severe enough to disrupt your daily activities. It is a headache characterized by recurrent attacks of moderate to severe throbbing and pulsating pain on one side of the head. It occurs most frequently in the morning, some people have migraines at predictable times, such as before menstruation or on weekends following a stressful week throughout workspace. It is a brain and nervous system disorder.[2]

Multisensory integration is the process of merging inputs from multiple senses to create a perception that is distinct from, and cannot be easily broken down into, its individual sensory components.[3] This integration is operationally defined as a statistically significant difference between the response elicited by combining sensory

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stimuli and the response elicited by the most effective single stimulus. In terms of single-neuron physiology, this comparison is made between the total number of neural impulses or firing rates generated by the combined stimuli versus those generated by each stimulus individually.[4,5]

In summary, multisensory integration involves various processes where information from multiple senses is combined to create an enhanced or diminished response. However, other multisensory computations, such as comparing stimulus features (like shape) across different modalities or detecting cross-modal timing and rhythm, require the individual sensory inputs to retain their distinct identities rather than merge into a single output.[4] As a result, these processes likely have distinct mechanisms and developmental trajectories, yet not fully understood. The issues the policewomen face is mostly workplace stress due to the work. Migraines occur three to four episodes for an individual in the group.[6,7] Therefore, this study is aimed to reduce the migraine levels by multisensory integration of policewomen.

Materials and methods

The MIDAS was created to assess headache-related disability and enhance communication between physicians and patients regarding the impact of migraines on daily life. The MIDAS questionnaire consists of five questions that measure the amount of lost time across three areas: work-related activities, household chores, and family, social, and leisure activities. It is designed for physicians, nurses, pharmacists, and other healthcare practitioners. MIDAS questionnaire through a standard method proved its validity and reliability to be used for evaluation of migraine.[8]

Interpretation

MIDAS scores closely align with physician assessments of illness severity and treatment needs. The scoring system is categorized as follows: little or no disability (5 to 10), moderate disability (11 to 20), and severe disability (more than 20). As a crucial component of a comprehensive approach that includes educational, diagnostic, and therapeutic strategies, the MIDAS questionnaire can significantly enhance the management of migraine and other headache types. A randomized, placebo-controlled trial has demonstrated that the MIDAS grade can guide the selection of initial treatment in a stratified care model.[9]

Participants

Policewomen with migraine were invited to participate in the study. The inclusion criteria were policewomen with moderate to severe migraine, aged from 20 to 60 years and scores above 5 of are included. Participants were excluded if they had visual impairment and conditions like pathological and neurological. The Ethical Committee (SCOTISRB059) authorized the trial, and eligible subjects provided written informed permission before participating in the study.

Protocol

Participants were interviewed and assessed for their demographic details (including name and age) and migraine features such as headache, trigger duration, causes, and severity using MIDAS (Migraine Disability Assessment Test). The MIDAS is a 5-item Questionnaire that assesses disability caused by migraine. The score ranges from 0 to 270. Higher scores indicate greater disability caused by migraine. Policewomen with scores of 21 or greater considered severe. Eligible participants were divided into 2 groups, intervention and control. The participants in the intervention group were exposed to a multisensory program when the control group received conventional occupational therapy. The participants in both groups were followed for 3 months to determine the effect of the migraine and its triggers (Table 1).

Table 1. The intervention and activities.

Sessions	Intervention	Activities
1	Introduction and assessment	- Establish rapport and trust - Discuss the client about migraine history and triggers
2, 25	Visual stimulation	- Introduce soothing visual aids like calming images and soft lighting
3	Sound therapy	- Introduce calming sound or music
4	Olfactory stimulation	- Explore different essential oils for stimulation - Combine olfactory stimulation with guided visual techniques
5, 6, 18, 19, 20, 26	Tactile stimulation	- Incorporate tactile stimulation through textures and object-based activities
7,8,28	Auditory stimulation	- Calming images with soothing music
10, 11, 21, 23, 30, 31, 32, 33, 34	Sensory-scenario-based training	- Integration for sensory experience in training - Immersive stimulation to enhance senses
12, 15, 29	Combined visual and sound therapy	- Calming images and lighting with soothing music - Flash lighting infused with sound effects
16, 17, 24, 27	Migrarelief device	- Migrarelief device was used for reduction of pain
35	Post-test	- Analyze post test score for migraine
36	Personalized integration and review	- Review of the effectiveness of each technique

Statistical analysis

The data was analyzed by the Wilcoxon signed rank test to test the statistical difference between pre-test and post-test of experimental and control group. Mann Whitney U test was applied for the comparison of post-test score, which identifies whether there exists statistically difference in consideration of the treatment given. The level of p=0.05 was measured to be statistically significant. The statistical analysis was performed using IBM SPSS version 24.0.

Results

At the beginning, 55 individual policewomen with migraines participated in this research. Nevertheless, 25 were excluded because they had mild migraine (N=12), visual and auditory impairments (N=10), and no interest in participating (N=3). Finally, 30 samples completed this research. Thirty participants were divided into two groups of 15: intervention and control groups.

There is a significant reduction in migraine level among female police officers. The data analyzed the pre-test and post-test scores of both control group (Figure 1) and experimental group (Figure 2), showing a significant difference between groups (Table 2). Since the p<0.05,

we accept the alternative hypothesis. Hence, there is a statistically significant difference in post-test scores between experimental and control group of the MIDAS. This suggests that the intervention received by the experimental group had more improvement when compared to the control group. Since the p=0.00 is lower than 0.05, we accept the alternative hypothesis. Hence, there is a statistically significant difference between pre- test and post-test scores in the control group of the MIDAS. This suggests that the intervention received by the control group had significant improvement.

In the Experimental group, since the p=0.001 is less than 0.05, alternate hypothesis is accepted. Hence, there is a statistically significant difference in experimental group between pre-test and post-test scores of MIDAS (Table 3). This suggests that the intervention received by the experimental group had significant improvement. Since the p=0.037 is lesser than 0.05, alternate hypothesis is accepted. Hence, there is a statistically significant difference in post-test scores between experimental and control group of the MIDAS (Table 4). This suggests that the intervention received by the experimental group had more improvement when compared to the control group.
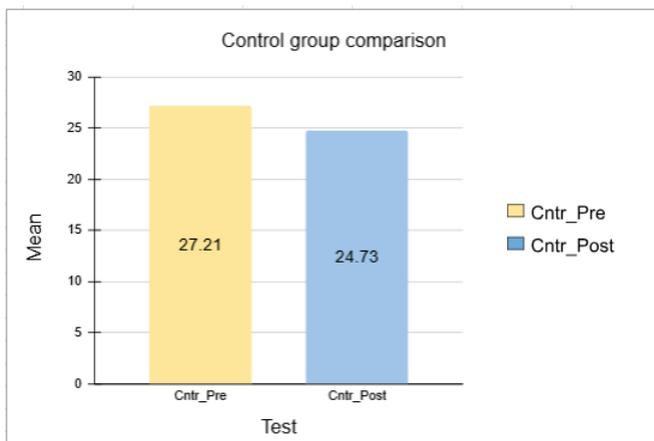
Figure 1*. Statistical analysis of pre- test and post- test in control group*
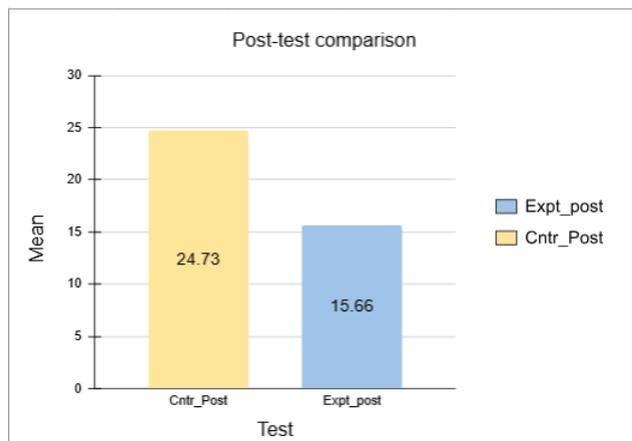
Figure 2*. Statistical analysis between the post- test scores of the control and experimental group.*

Table 2. Statistical analysis of pre- test and post- test in control group.

Test	Mean	SD	N	Z value	p value
Cntr_Pre	27.2	12.22527	15	-3.496	0.00*
Cntr_Post	24.7333	11.73193	15		

Note: *significant at 5% alpha level, Cntr: control group.*

Table 3. Statistical analysis of pre-test and post-test in experimental group.

Test	Mean	SD	N	Z value	p value
Expt_Pre	26.4	9.24121	15	-3.417	0.001*
Expt_Post	15.6667	7.95224	15		

Note: *significant at 5% alpha level, Expt: experimental group.*

Table 4. Statistical analysis between the post- test scores of the control and experimental group.

Group	Mean	SD	N	Z value	p value
Cntr_Post	24.7333	11.73193	15	2.094	0.037*
Expt_Post	15.6667	7.95224	15		

Note: *significant at 5% alpha level, Cntr: control group, Expt: experimental group.*

Discussion

The study aimed to find the effect of multisensory integration on policewomen with migraines. It was conducted at the St Thomas Mount and Guindy police station in Chennai.

A total 30 policewomen with moderate or severe migraine were selected by the selection criteria described in the methodology. They were allocated to experimental and control group using convenient sampling technique. The age of the chosen sample ranged between 20 to 60 years. It includes only policewomen officers.

Both experimental and control groups were measured with the MIDAS scale to identify the level of migraine. The experimental group underwent multisensory integration therapy intervention, whereas the control group underwent conventional occupational therapy. The multisensory integration therapy intervention session consists of 36 sessions in 3 months, each lasting 45 minutes. The effectiveness of the intervention was analyzed by comparing the pre-test and post–test values of the control and experimental groups.

In the control group, the conventional occupational therapy program included occupational based activities and relaxation techniques. Since the p=0.00 is less than 0.05, there is a statistically significant difference between pre- and post-test scores in the Control Group of MIDAS. This suggests that the intervention received by the control group had significant improvement. The result of this study is like another study reviewed by Philips EG, which explored occupational therapy's role in headache and migraine management for women in military aviation fields through a biopsychosocial approach. This study shows conventional occupational therapy intervention reduces migraine among individuals.[10]

Table 2 and Figure 1 illustrate the results of the experimental group's multisensory integration-based occupational therapy intervention. The p=0.001, below the significance level of 0.05, indicates that the difference between pre-test and post-test scores on the MIDAS scale is statistically significant. This finding suggests that the intervention led to a notable improvement in migraine symptoms among participants. Additionally, 9 out of 15 participants reported greater satisfaction with the outcomes of multisensory activities, such as visual and tactile stimulation, which further supports the effectiveness of the intervention in reducing migraines.

Table 4 and Figure 2 compare post-test MIDAS scores between the experimental and control groups. The statistical analysis reveals a significant difference, with the experimental group improving more than the control group. This highlights the superior effectiveness of the multisensory integration-based intervention compared to the control condition. These results are consistent with findings from Schwedt *et al*., which demonstrated that multisensory integration therapy effectively reduces migraines.[11] The study by Schwedt *et al* also found significant improvements in various sensory stimulations—visual, tactile, auditory, and olfactory—benefitting patients with migraine disabilities in their daily lives. However, the study has some limitations regarding its findings and clinical implications. The study was done with a limited duration of 3 months, a randomized controlled study was not used, the blinding method was not used, and convenient samplings could have influenced the results of the study.[11]

Conclusion

This study examined the effect of the intervention on migraines level among policewomen over 3 months. A total of 30 policewomen with moderate to severe migraines were selected. They were divided into two groups: the experimental group, consisting of 15 policewomen who received multi-sensory integration therapy, and the control group, with 15 policewomen, who received conventional occupational therapy. The results indicated a statistically significant difference between both groups' pre-test and post-test scores. Further analysis showed that the experimental group experienced a notable improvement compared to the control group, highlighting the effectiveness of multi-sensory integration therapy in alleviating migraines among policewomen.

Ethical approval

The study has been approved by the Institution Scientific Review Board (ISRB) of Saveetha of Occupational Therapy, with Reference No SCOT/ ISRB /059 /2023.

Conflict of interest

There are no conflicts of interest.

CRedit authorship contribution statement

Benielraja Gnanadurai: study design, data analysis and manuscript preparation; Sharon Magadalene: study conduct under the primary author's supervision. All author's approved the manuscript.

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