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Effectiveness of Music-Based Therapeutic Intervention on People with Dementia: A Rapid Review

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Abstract

Background: Dementia is a condition with progressive cognitive dysfunction and manifestation of both behavioral and psychosocial symptoms. Non-pharmacological measures such as music therapy are gaining importance since efficacy and safety of people with dementia have been questionable for pharmacological measures. Patient's response to music is persistent even in the later stage of dementia. Aim: This rapid review aims to identify, analyze, evaluate, and summarize the best available evidence on the effectiveness of music-based therapeutic interventions among people with dementia. Method: CINAHL Cochrane Library, internet websites of rapid review producers, and reference lists were searched to identify articles for inclusion. Two reviewers independently screened the literature search results. Effectiveness, music-based therapeutic intervention, dementia, Alzheimer's disease, systematic review and systematic review with meta-analysis terms were used to abstract data from included studies. Main Findings: 11 SRs and SRs with meta-analysis were reviewed which revealed positive effect of music therapy on five major outcomes with 9 studies effect on behavioral outcome, 6 studies with positive effect on psychosocial outcome reducing anxiety, 6 with improved cognition, 1 study revealed with improved quality of life and 1 study revealed effect on physiological outcomes. Conclusion: Music therapy has positive effect on treatment of dementia but further studies with larger sample size and specified to single intervention should be conducted to provide generalisable and precise results on this topic.

Keywords

Dementia, Rapid Review, Music Therapy, Behavioral, Cognitive, Quality of Life

1. Background

Dementia is a condition characterized by progressive cognitive dysfunction with the manifestation of behavioral and psychological symptoms hindering the individual to perform daily activities, and fulfilling social function. It has affected more than 50 million people worldwide [1]. Despite the presence of numerous pharmacological measures to ameliorate the symptoms, the safety and efficacy of these measures are questionable. Music therapy is one of the best complementary therapies for people living with dementia [2].

In today's world music therapy is an attractive form of intervention for the growing number of demented patients, for whom pharmacological interventions are not always effective and may lead to undesired side effects that use musical elements such as sound, rhythm, harmony, and melody for the treatment of a range of psychological, psychiatric, and physical conditions. Being inexpensive and without adverse side effects, current knowledge seems to indicate that music interventions can be recommended for patients in all stages of dementia [3]. Music addresses developmental, adaptive, and rehabilitative goals in areas of psychosocial, cognitive, and sensory motor behavior of an individual. The existence of evidence that music memory and ability to enjoy music persists even in the later stages of dementia has served as a basis for music-based therapeutic intervention [4]. In addition to music therapy, different types of conventional complementary therapies such as acupuncture, aromatherapy, art therapy, hypnotherapy, hydrotherapy, massage therapy, herbal remedies, meditation, and yoga have been widely practiced throughout world [4] [5].

With the growing body of research, it is quite challenging to identify the substantial body of evidence to incorporate in practice. Systematic reviews and meta-analyses of quality research serve as a standard approach to appraise and synthesize the evidence into practice. Whilst there are numerous articles on this topic, the intervention and outcome varied widely making the findings comprehensive for practice. Hence, this study aimed to review the existing systematic reviews and meta-analyses on music therapy from selected database and summarize the best available evidence which can be incorporated for the treatment of dementia. It compares different effectiveness in different outcomes and provides comprehensive findings for future practice and research.

2. Methods

This review was conducted as per Cochrane handbook for systemic review and interventions guidelines [6] and was reported following Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines [7]. The PICO model is used as a tool for structuring clinical research questions in connection with evidence syntheses (e.g., systematic reviews). As *The Cochrane Handbook for Systematic Reviews of Interventions* specifies using PICO as a model for developing a review question, thus ensuring that the relevant components of the question are well defined [8]. The PICO framework is primarily

centered on therapy questions, and although it can be adapted to formulate research questions related to prognosis or diagnosis [9]. Rapid review is performed as they are a form of knowledge synthesis in which components of the systematic review process are simplified to produce information in a timely manner [10].

2.1. Data Source and Search Strategy

In September 2023, we selected the articles using terms such as effectiveness, music-based therapeutic intervention, dementia, Alzheimer's disease, systematic review and systematic review with meta-analysis from the CINAHL Cochrane Library, and internet websites. We limited our search from 2010 until January 2023. An expert librarian drafted the literature searches based on the previous reviews, which may be refined through a team discussion [10]. All studies identified during the database search were assessed for relevance to the review based on the information provided in the title, abstract, and descriptor. A full report was retrieved for all studies that met the inclusion criteria (**Appendix B**). Study identified from reference list searches were assessed for relevance based on the study title. A detailed search strategy for relevant databases and literatures is presented in **Appendix A** and **Appendix B**.

2.2. Screening

All records from the different search databases were imported to Endnote reference management software to remove duplicates. Two reviewers independently conducted title and abstract screening to select studies for full-text review. Likewise, two independent reviewers conducted full-text screening using inclusion and exclusion criteria listed below to select studies for inclusion in the review. Any discrepancies in any stage of screening during review were resolved through consensus.

Eligibility criteria:

The eligibility criteria were structured according to the components of the Population, Intervention, Comparator, and Outcome (PICO) framework [11], in which population living with dementia were considered population, active, passive, professional-guided, individualized or group music therapy were considered intervention, non-music-based therapy, usual care, standardized care were considered comparison, and behavioral, psychosocial, cognition, quality of life, physiological outcomes were considered outcome.

2.3. Potential of Bias in the Review Process

The risk of bias assessment was conducted by two reviewers separately and compared. Any disagreements between reviewers were resolved amicably through consensus. Certain are made in this study. First is the exclusion of large number of studies which did not meet the inclusion criteria. This might have limited the evidence base. Articles from 2010 were selected which might not be consistent with the current policy and practice. Also, articles were hand searched from Google scholar which might have created selection bias.

2.4. Study Outcomes

The review included 8 articles extracted from CINAHL, Cochrane Library and 3 most relevant articles were hand-picked from Google scholar which fulfilled the inclusion criteria. The results are categorized according to the identified outcomes.

2.5. Data Extraction and Analysis

Two independent reviewers' extracted data based on an agreed data extraction template (**Table 1**) and compared them for any inconsistency. Descriptive analysis was conducted. To synthesize the descriptive results, we conducted the qualitative analysis. All inconsistencies were resolved amicably via discussion. Content analysis was conducted by one team member to synthesize the common methodologies used across the included rapid review using a framework. The framework was developed by review team. Recorded information consisted of author, year, country, search details, range(database searched, articles included), Quality score, Number of studies, Design of included studies, Interventions/ Control group, Main outcome measures. This framework provides a structural approach for the complex interplay of behavioral outcomes, psychosocial outcomes, cognitive outcomes, quality of life and physiological outcomes. As per search strategy PRISMA 2009 flow chart was used and to analyze the quality of selected articles JBI Critical Appraisal Check list for Systematic Reviews and Research Syntheses [12] used. The overall outcomes of the articles been extracted for analysis as per overview table with specific outcomes from the articles.

3. Results

The electronic database search across CINAHL and Cochrane Library identified 163 articles. Additional records were identified through Google scholar with 30,200. After removing the duplicates resulted for 30,037 articles. Of these, 29,991 were excluded due lack of inclusion criteria of systematic review, meta-analysis and terminologies of dementia patients without term of intervention of Music therapy. The records remained after screening is 46 articles and with eligibility criteria of full text articles were 14. Finally, 3 were excluded having low quality score and 11 Systematic review were selected for rapid review process. A flow diagram of selection of studies is shown in **Figure 1**.

The table with overview of characteristics outcome listed as **Table 1**.

The characteristics overview of the outcomes concluded with specific results listed as

a) Behavioral Outcomes:

Out of eleven, nine studied effect of music therapy on behavior of people with dementia. The study of Van der Steen *et al*. (2018), Chang *et al*., (2015) showed moderate effect. Likewise, study of Gaviola, Inder, Dilwor, Holliday, and Higgins (2020), Gomez-Romeroa *et al*. (2016), McDermott, Crelin, Ridder, and Orrell, (2012) showed significant evidence on behavioral outcome. Likewise, study of Ueda, Suzukamo, Sato, and Izumi (2013) and Zhanga, *et al*. (2017) revealed small effect.

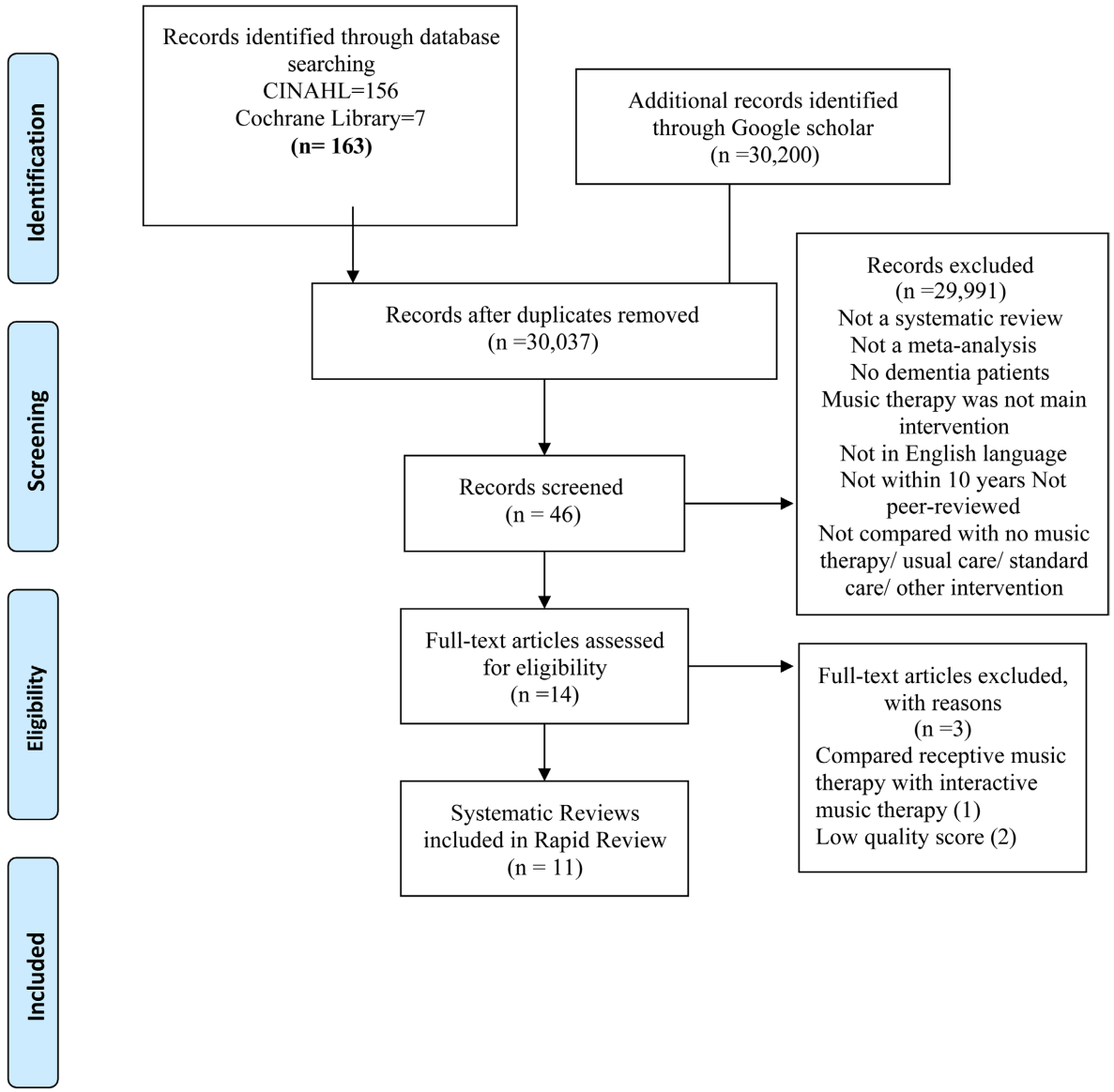

Figure 1. PRISMA 2009 flow diagram.

Table 1. Overview of characteristics of outcome.

Author Year Country/Area	Search details, range (database searched, articles included)	Quality score	Number of studies Design of included studies	Interventions/ Control group	Main outcome measures
Chang, *et al.*, 2015 Taiwan Area [13]	PubMed, Medline, Cochrane Library Database, CINAHL, SCOPUS and Psyc INFO. January 2000 to February 2014	11	10	Individual Music therapy Group music therapy Compared with no music intervention or usual care or standard care	Disruptive behaviour Anxiety Depressive moods Cognitive functioning

Continued

Fusar-Poli, *et al*., 2018 Spain [14]	MEDLINE, EMBASE, Psyc INFO, CINAHL, Cochrane Library, Web of Science, Journal of Music Therapy, and Nordic Journal Of Music Therapy 1985-2011	9	18	Active Music therapy Receptive music therapy Individual music therapy Group music therapy Compared with usual care or standard care	Mood improvement Disruptive behaviour Long-term benefits
Gaviola, *et al*., 2020 Australia [15]	CINAHL, Medline, ProQuest, PsycINFO, Music Periodicals and Cochrane Up toJuly2018	9	4	Individualised music therapy Compared with no music intervention	Behavioural and psychosocial symptoms Anxiety and depression Agitation Physiological symptoms Mood and emotion Cognition Quality of life
Gomez-Romeroa, *et al*., 2016 Spain [16]	Academic Search Complete, PubMed, Science Direct y Dialnet 2003-2013	11	11	Active music therapy Receptive music therapy Individual music therapy Group music therapy Compared with no music Intervention	Behaviour disorder Anxiety Agitation
Li *et al*., 2019 Taiwan Area [17]	AgeLine, CINAHL, MEDLINE, PsycINFO, PubMed, and Cochrane Library Articles till April 2019	8	7	Passive music therapy. Compared with usual care or standard care, no music therapy, other interventions	Depressive symptoms
McDermott, Crellin, Ridder, & Orrell, 2012 UK [18]	MEDLINE, EMBASE, PsycINFO, CINAHL, Cochrane Library, Web of Science, Journal of Music Therapy, and Nordic Journal of Music Therapy 1985-2011	11	18 RCTs	Active music therapy Receptive music therapy Individual music therapy Group music therapy	Behavioural and psychological aspects Hormonal and physiological changes Social and relational aspects
Moreno-Morales *et al*., 2020 Spain [19]	Medline, PubMed Central, Embase, PsycINFO, and the Cochrane Library 1990to2020	9	8RCTs	Active music therapy Passive music therapy Compared with usual care or standard care	Cognitive function Quality of Life Depression
Ueda, Suzukamo, Sato, & Izumi, 2013 Japan [20]	MEDLINE, CINAHL, PsycINFO, and Igaku Chuo Zasshi Till February 2011	11	20RCTs N:651	Active music therapy Passive music therapy Compared with no music intervention	Psychological symptoms Behaviour, Cognition, Activity of daily living, Depression, Anxiety, Cognition

Continued

Vander Steen, *et al*., 2018 Netherland [21]	ALOIS, specialized register of the Cochrane dementia and cognitive improvement group (CDCIG) searched on June 2017 MEDLINE, Embase, PsycINFO, CINAHL and LILACS Up toJuly2017	11	22 RCTs N:890	Music-based therapeutic interventions include: Active or receptive, delivered to individuals or groups. Minimum of 5 sessions Provided by music therapist meeting at least two criteria (therapeutic objective, Matching individual preference, active participation, clinical indication) Compared with any other type of therapy/activity, no therapy/activity	Emotional well-being Mood disturbance Depressive symptoms Anxiety Behavioural problems Cognition Social behaviour Any adverse effects
Vasionyte & Madison, 2012 Sweden [2]	JSTOR, EBSCO, ERIC, SCIRUS, MEDLINE, PsycINFO, Cochrane Library, ProQuest, SAGE PUB, Cambridge Journals UptoApril2011	9	19 N:478	Active music therapy Receptive music therapy Individual music therapy Group music therapy Compared with no music intervention	Affective outcome: Depression, Anxiety Behavioural outcome: agitation, disruptive behaviour Cognitive outcome: Language abilities Physiological outcome: heart rate, breathing rate and blood pressure
Zhanga, *et al*., 2017 China [22]	PubMed, Embase and the Cochrane Library From inception to September 2016	11	34	Any form of music intervention Compared with no music intervention	Disruptive behaviour Cognitive function Depressive behaviour Anxiety Quality of life

b) Psychosocial outcomes:

Psychosocial outcome comprises of anxiety, agitation, mood disturbance and depressive symptoms. All the selected study except one has studied at least one of the psychosocial aspects. Among them, Chang *et al*. (2015), Gaviola *et al*. (2020), Gomez-Romeroa *et al*. (2016), McDermott *et al*. (2012), Ueda *et al*. (2013), and Vander Steen *et al*. (2018) showed evidence of positive effect on reducing anxiety.

Furthermore, Chang *et al*. (2015) showed small effect on depressive moods. Moreno-Morales, Calero, Pedro, and Pintado, (2020) revealed benefit on long-term depression which is contradictory to the study of McDermott *et al*. (2012). Gaviola, Inder, Dilwor, Holliday, and Higgins (2020) Ueda, Suzukamo, Sato, and Izumi (2013), Van der Steen *et al*., (2018) showed moderate effect. Statistical significance was seen in the study of Li *et al*. (2019) when the therapy was provided by professional music therapist.

c) Cognitive outcome:

Among nine studies, Chang *et al*. (2015), Fusar-Poli *et al*. (2018), Moreno-Morales *et al*. (2020), Van der Steen *et al*. (2018), Vasionyte and Madison (2012) and Zhanga *et al*. (2017) showed improved cognition due to music therapy. On the other hand, Ueda *et al*. (2013) showed no effect on cognition level.

d) Quality of life:

Study of Moreno-Morales *et al*. (2020) revealed short term benefit on improving quality of life. It was consistent with the study of Gomez-Romeroa *et al*., (2016), Vander Steen *et al*. (2018), and Vasionyte and Madison (2012). The finding varied with the study of Gaviola *et al*. (2020) which showed no effect on improving quality of life.

e) Physiological outcome:

Studies of Gaviola *et al*. (2020) and Vasionyte and Madison (2012) revealed some effect of music therapy on physiological well being. Study of McDermott *et al*. (2012) showed no effect on physiological aspect.

4. Discussion

Dementia has become a global burden with more than 50 million case reported by WHO (2019). Along with it, the focus has on non-pharmacological intervention which is more cost-effective with less adverse effect. Music therapy being one of them has been widely known for its ability to address developmental, adaptive, and rehabilitative goals in dementia.

This is the first review employing a comprehensive search and critical appraisal strategy for identifying, analyzing, and evaluating quality systematic reviews on the research topic. This has contributed a comprehensive summary of the evidence of effectiveness of music therapy on People living with dementia (PWD). The review findings relate to 11 reviews that explored five outcome measures: behavioral, psychosocial, cognitive, quality of life and physiological. The JBI critical appraisal tool was used for quality appraisal [12]. Those articles which fell under the category of low quality (<5 score) were excluded.

The overall findings suggested positive effect of music therapy on People living with dementia with most articles having behavioral and psychosocial outcomes. Though, limited articles were under review process. The outcome of JBI critical appraisal tool listed in Appendix 1 provides the strength of selected articles with positive outcome that are undertaken for review. According to study of Jacobsen *et al* (2015), music therapy stimulates awareness of the environment. It fosters wide cortical activation in brain and influences hormonal levels causing relaxation, and sense of safety and well-being. Music associated with special events and memory is proven to evoke positive emotions in an individual [23]. This might lead to reduced behavioral and psychosocial outcome in PWD. There were article suggesting music therapy activating cortical areas of brain and regulating neurotransmitters which improve cognitive function [3] [24].

Some of the studies in the review had reported small sample size. Study of Gaviola *et al*. (2020), Li *et al*. (2019) and Moreno-Morales *et al*. (2020) had the

sample size of 4, 7 and 8 RCTs respectively. Also, there is presence of heterogeneity in terms of treatment fidelity, intervention type, use of variable outcome measurement tool which hinders to reach reliable conclusion. In music therapy, treatment fidelity includes exposure or dose, adherence, quality of delivery, participants responsiveness and program differentiation [18]. The study of Ueda *et al*. (2013) reported varying result when music therapy was given for varying duration. The study of Fusar-Poli *et al*. (2018) had undertaken intervention only provided by music-therapist, while others have not created restriction upon delivery. Moreover, the outcome measurement tool also varied across all the studies depending upon the location of the study conducted.

Though the outcomes from this paper cannot be generalized, this study provides a pool of information to study benefits of music therapy on people with dementia. More studies are needed to be done in a larger study sample to provide more precise results. Studies in regards of intervention type, specified outcome and duration should be conducted in future.

Our rapid review has some limitations. To make our review more feasible, only literatures found in two electronic databases were searched and small number of studies met the inclusion criteria. Hand search of articles from Google scholar might have created selection bias. Furthermore, this rapid review was an enormous undertaking and our results are only up to the date of January 2023. However, we believe that our findings crucial information on rapid reviews.

5. Conclusion

In this rapid review study, 11 high quality systematic review obtained from extensive search of databases have revealed 5 major outcomes, they are behavioral, psychosocial, cognitive, physiological, and quality of life. Their view revealed a positive effect of music therapy on people with dementia. However, further research in larger scale can provide more generalizable findings in this area.

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Author's Contribution

This study was conceptualized and designed by SS, SK, and YPJ. Title and abstract screening, full-text screening, data extraction and analysis were conducted by SS, SK, YPJ, PS. The first draft of the manuscript was written by SS, SK and all authors comments on previous versions of the manuscript. All authors approved the final manuscript.

Conflicts of Interest

The authors declare no competing interests.

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Appendix

Appendix A. JBI critical appraisal check list for systematic reviews and research syntheses [12].

Items	Chang *et al.* (2015)	Fusar-Poli *et al.*	Gaviola etal. (2020)	Gomez etal. (2016)	Li *et al.* (2019)	Mc. Dermott *et al.*	Moreno-Morales	Ueda *et al.* (2013)	Van der Steen *et al.*	Vasionyte (2012)	Zhanga *et al.* (2017)
1) Is there view question clearly and Explicitly stated?	1	1	1	1	1	1	1	1	1	1	1
2) Were the inclusion criteria appropriate for There view question?	1	1	1	1	1	1	1	1	1	1	1
3) Was the search strategy appropriate?	1	1	1	1	1	1	1	1	1	1	1
4) Were the sources and resources used to Search for studies adequate?	1	1	0	1	1	1	0	1	1	0	1
5) Were the criteria for appraising studies appropriate?	1	0	0	1	1	1	1	1	1	0	1
6) Was critical appraisal conducted by two Or more reviewers independently?	1	1	1	1	1	1	1	1	1	1	1
7) Were there methods to minimize errors in Data extraction?	1	0	1	1	0	1	1	1	1	0	1
8) Were the methods used to combine Studies appropriate?	1	1	1	1	0	1	1	1	1	1	1
9) Was the likelihood of publication bias assessed?	1	1	1	1	0	1	1	1	1	1	1
10) Were recommendations for policy and/or practice supported by the reported data?	1	1	1	1	1	1	1	1	1	1	1
11) Were the specific directives for new Research appropriate?	1	1	1	1	1	1	0	1	1	1	1
Total	11	9	9	11	8	11	9	11	11	9	11

Appendix B. Search Strategy in CINAHL plus and Cochrane Library.

1) Effectiveness OR efficacy OR impact OR consequences;

2) Dementia OR Alzheimer;

3) "Music-based therapeutic intervention" OR "music therapy" OR "music intervention";

4) 1 AND 2 AND 3;
5) Systematic review;
6) "Meta-analysis" and "systematic review*";
7) 5 OR 6;
8) 4 AND 5;
9) 4 AND 7;
10) Limit 9 to (English language, peer-reviewed, year 2010-2023 January).