Original Article
doi:10.31674/mjn.2023.v14i03.014

The Effects of Essential Oil Massage on Patients Affected by Alzheimer's Disease: An Observational Study

Antonio Bonacaro[1]*, Ivan Rubbi[2], Carmela Triglia[3], Valeria Cremonini[2], Alessia Conti[4], Sharon Brownie[5]

[1]Department of Nursing, University of Suffolk, Ipswich IP4 1QJ, United Kingdom
[2]School of Nursing, University of Bologna, 40126 Bologna BO, Italy
[3]Orthopedics Ward, Ferrara Hospital, 44122 - Ferrara, Italy
[4]Villa Maria Private Hospital, 48033 Cotignola RA, Italy
[5]School of Health Sciences, Swinburne University of Technology, Hawthorn, VIC 3122, Australia; School of Nursing, Griffith University, Nathan QLD 4111, Australia

**Corresponding Author's Email: a.bonacaro@uos.ac.uk*

ABSTRACT

Background: Alzheimer's Disease (AD) is the most widespread form of dementia. The present study analyses the effects of aromatherapy using *Melissa Officinalis* essential oil, applied by massage to the hands and forearms of patients suffering from Alzheimer's disease. and to evaluate the effect on their perceived overall quality of life. **Methods:** A prospective observational study was conducted in two nursing homes in Italy in 2018. Data were collected through individual qualitative structured interviews based on the Quality of Life in Alzheimer's Disease (QoL-AD) questionnaire and the Mini Mental State Examination (MMSE). The authors referred to STROBE guidelines for quality reporting of observational studies. **Results:** Treatment with Melissa Officinalis showed positive effects on all patients after the 12th week of treatment. The results were most evident in patients in class 3 MMSE. However, class 4 MMSE patients also benefited from the treatment. **Conclusion:** The aromatherapy treatment delivered in this observational study, using *Melissa Officinalis* essential oil applied to hands and forearms, showed an improvement in the quality of life of the patients living in two different nursing homes. Due to the small sample size in this study, it is suggested that more research be done on the effects and effectiveness of aromatherapy with *Melissa Officinalis* essential oil for Alzheimer's disease patients.

Keywords: Quality Adjusted Life Years; Mental Status and Dementia Test; Alzheimer Disease; Aromatherapy; Essential Oil

INTRODUCTION

According to the American Academy of Neurology, Alzheimer's Disease (AD) represents one of the most severely disabling diseases occurring in advanced age. AD is characterised by a progressive decline in cognitive functions such as memory, language, and learning capacity (Zhang *et al.*, 2019; Lim *et al.*, 2021). In addition to cognitive impairment, behavioural and psychological disorders (BPSD) such as agitation and wandering may also occur with negative repercussions on daily life activities (Steele *et al.*, 1990; Kertapati *et al.*, 2022).

In 2015, 47 million people lived with varying forms of dementia, and this figure is expected to triple by 2050 (Prince *et al.*, 2016). There are 9.9 million new cases of dementia each year, meaning a new case every 3.2 seconds (Wimo *et al.*, 2017). This phenomenon will require considerable health and economic effort since dementia has very high social and economic costs, estimated at 818 billion dollars in 2015 (Wimo *et al.*, 2017). In Italy, dementia and Alzheimer's disease are also on the rise constituting the sixth leading cause of death in 2012 with 26,559 deaths (Istat, 2022). The new cases of dementia in Italy are about 150,000 a year, a total of about 2 million people across the country, with over 60,000 in the Emilia Romagna region (Iperbole, 2022).

Currently, there is no approved drug that specifically treats Alzheimer's disease, while there is increasing use of

Received October 6, 2022; Received in revised form: December 1, 2022; Accepted: January 3, 2023

alternative remedies such as aromatherapy with massage (Yang *et al.*, 2016). According to Snow and colleagues, inhalation only may have no effect on people with Alzheimer's disease because, in advanced stages, people may lose their sense of smell. Therefore, application on the skin is more effective than simply diffusing the essential oil (Snow *et al.*, 2004; Nascimento *et al.*, 2022). Aromatherapy combined with a massage can reinforce the natural therapeutic properties of essential oils and promote the healing power of massage (Clarke, 2008; Butje, 2017).

In the treatment of behavioural and psychological disorders, complementary and alternative medicines (CAM) are increasing interest. The National Centre for Complementary and Alternative Medicine defines CAM as a group of different medical and nursing practises and products that are not currently considered to be part of contemporary medical care (Tabish, 2008).

In its Traditional Medicine Strategy 2002–2005 and 2014–2023, the WHO refers to the considerable increase in the use of non-conventional medicine in many countries around the world (WHO, 2013). CAM includes acupuncture, physiotherapy, homoeopathy, reflexology, and aromatherapy (Van Der Watt *et al.*, 2008; Y Ng *et al.*, 2020). Aromatherapy is the use of pure essential oils obtained from various parts of plants, including flowers, roots, or leaves, to help improve mental and physical health, the quality of life in general, or just for pleasure (Maggio *et al*., 2016). Controlled and therapeutic use of essential oils can achieve measurable and specific outcomes (Buckle, 2016).

According to Snow *et al.* (Snow *et al.*, 2004; Watson *et al.*, 2019), the mere inhalation of oils through the olfactory system may have no effect on people with Alzheimer's disease because, in advanced stages, affected people may lose their sense of smell, while the application of oils on the skin appears to be effective. Applying massage allows the essential oils to also be absorbed into circulation through the skin. Therefore, the effect of the oils occurs mainly through nerve conduction. The peripheral nerves first, then the somatic nerves, and lastly the autonomic nerves are stimulated by the essential oils. Stimulation of the somatic nerves can induce the relaxation of skeletal muscles, and stimulation of the sympathetic and parasympathetic nervous systems can influence blood vessels, internal organs, and glands (Cook & Lynch, 2008; Nascimento *et al.*, 2022).

A convenience sample of 20 patients suffering from Alzheimer's disease was recruited with the aim of assessing their perceived general quality of life.

METHODOLOGY

The aim of this study is to analyze the effects of 31 sessions of aromatherapy using *Melissa Officinalis* essential oil, applied to patients' hands and forearms through massage, and to evaluate the effect on their perceived overall quality of life.

Design and Setting

A 15-week observational study was conducted in two nursing homes in a northern Italian region during the months of May, June, July, and August 2018. This manuscript is written in accordance with the STROBE guidelines for quality reporting of observational studies (von Elm *et al.*, 2007).

Study Population

A convenience sample of 20 patients suffering from Alzheimer's disease was recruited. The Quality of Life-AD (QoL-AD) (Yuliastuti *et al.*, 2022) and Mini-Mental State Examination (MMSE) questionnaires were used to assess the functioning of their global cognitive state (Logsdon *et al.*, 2002). The study involved a non-probabilistic sample of 20 people affected by Alzheimer's, residing in two different nursing homes, who were given the QoL-AD questionnaire after it was explained to them what items were on the questionnaire and how to answer them. Only patients who participated in more than 85% of the aromatherapy sessions were included. These patients agreed voluntarily to take part in the survey, following an explanation regarding the aromatherapy sessions. Prior to the beginning of the study, patients were evaluated by the physician working in the nursing home and through the MMSE evaluation scale, which was first published in 1975 by Folstein *et al.,* in the Journal of Psychiatric Research (Folstein,

1975).

25 people participated in the study, of whom 5 (20%) were excluded because they did not attend several sessions (> 85%). The personal data of the 20 people included in the research are 30% (n = 6) males and 70% (n = 14) females, with an average age of 83 (7.5 SD). The sample was made up of 45% (n = 9) widowed, 35% (n = 7) married, 15% (n = 3) unmarried, and 5% (n = 1) separated people. Among the patients studied, 40% (n = 8) have an elementary school diploma, 25% (n = 5) have no education, 20% (n = 4) have a high school diploma, and 15% (n = 3) have a junior high school diploma. Patients with a class 4 MMSE are the most representative, with a percentage of 80% (n = 16), followed by those with a class 3 and a class 2 with 10% (n = 2) (Table 1).

Table 1: Sample Demographic Characteristics

Characteristics	**n(%)**
	n = 20
Gender	
Male	6(30)
Famale	14(70)
Marital Status	
Widowers	9(45)
Married	7(35)
Unmarried	3(15)
Separated	1(5)
Education	
Primary school	8(40)
Illiterate	5(25)
High school	3(15)
MMSE class	
Class 4	16(80)
Class 2-3	4(20)
	M±SD
Sample age	83.0±7.50

Data Collection

Data collection occurred through a quality-of-life assessment tool called the Quality of Life – AD, which assessed the perceptions of patients affected by Alzheimer's (Cooke *et al.*, 2010; Logsdon *et al.*, 1999; Rubbi *et al.*, 2016).

The questionnaire was administered in the form of an interview with the patient himself or herself. This tool investigates the participant's relationships, possible concerns for their finances, physical condition, mood, and a general consideration of their perceived quality of life. The interview took about 5–10 minutes, and it consisted of asking each question and recalling the possible answers (poor, discreet, good, excellent). The questionnaire consisted of 13 items evaluated on a scale from 1 to 4, where 1 corresponds to "poor," 2 to "discrete" 3 to "good," and 4 to "excellent." Therefore, the total scores vary from 13 to 52.

Researchers explained the study in full to the manager of the nursing homes including the duration of the study and provided information about the time involved in consenting patients' involvement which included regular meetings

twice a week. The appointments were always kept on the scheduled day and time to ensure consistency for participating patients. During the meetings, patients received a hand and wrist massage using *Melissa Officinalis* essential oil mixed with almond oil used as a base for a duration of 5–10 minutes. While 10 minutes were considered the gold standard in line with the study findings of researchers at the University of Konstanz (Meier *et al*., 2020), we hypothesised that a minimum duration of 5 minutes would be equally effective and suit the needs of busy caregivers or clinical environments. During this time, the patient was encouraged to talk with the person giving the massage. At the end of each session, the participants were asked verbally the questions on the QoL-AD questionnaire. Their privacy was respected, and the person who was filling in the questionnaires carried out this task using the first person.

The first meeting took place in nursing home 1 on the 12th of May 2018, and the second in nursing home 2 on the 11th of May 2018 (time 0). On these days, it was explained to the patients how the meetings would be conducted, the duration of each individual massage, and the subsequent administration of the questionnaires that investigate the quality of life perceived by each participant. During the first meeting, the QoL-AD was administered with the purpose of creating a time 0 and creating starting values. On this occasion and in any subsequent questionnaire administration, patients were provided with further clarifications when they struggled to understand the meaning of any question. Furthermore, a caregiver was asked to participate in the treatment session with any class 4 MMSE patient. The presence of a caregiver ensured more accurate data collection in patients who struggled to verbally express themselves (Sustrami *et al.*, 2022).

Ethical Consideration

The study was authorized by the nursing home ethics committee on the 12th of February 2018 (Reference number 2018/ResCam/17).

Bias

Bias minimization was pursued by putting in place the following strategies: all patients who volunteered to take part in the study were assessed by a physician and through the MMSE assessment scale. The physician's assessment included patients' comorbidities and the effects of polypharmacy. In addition to creating a safer clinical environment for both researchers and patients, that allowed the recruitment of clinically homogeneous participants.

Furthermore, the masseuse responsible to deliver the intervention was not aware of the study hypothesis.

RESULTS

Data Storage and Analysis

For the data obtained through questionnaire administration, a database was created in Excel in which the dependent variables were inserted (physical health, vitality, mood, life condition, memory, family situation, marital status, friends, himself, ability to perform housework, ability to perform fun activities, financial situation, and life as a whole). Items listed in the assessment tool and the independent variables for analysis were:

Structure in which the patient was a guest, Age class, Marital status, The presence of a support administrator. The degree of cognitive impairment at the Mini-Mental State Examination (MMSE). 698 surveys were carried out across 32 sessions. Overall, each patient answered an average of 31.40 surveys (± 1.05 SD).

The determination of Cronbach's Alpha shows a good coherent attitude ($\alpha = 0.855$) (Nunnally, 1994) on all the items of the Quality of Life-AD. The test of equality of means, obtained through the sum of the Likert scale expressed by the patients on all the items of the instrument (R = 13–52), showed a difference in the quality of life perceived by the patients during the aromatherapy sessions (P =0.0001). The detection at time 0 (M = 21.90, DS = 4.973) before starting the experiment, shows a progressive improvement of the average value of the Quality of Life-AD during the 31 sessions, leading to an M = 28.94 (SD = 4.249) on the 31st session (Table 2).

Table 2: Differences between the Perceived Quality of Life During the Aromatherapy Sessions

Sessions	N. Participants	QoL-AD scores (mean±SD)	QoL-AD scores Standard Error	I.C. 95% (Lower±Upper)	F	*P*
(Time 0)	20	21.9±4.97	1.11	19.57±24.23	4.818	<0.001**
1	17	22.47±4.34	1.05	20.24±24.71		
2	17	21.94±4.32	1.04	19.72±24.16		
3	18	22.94±4.89	1.15	20.51±25.38		
4	19	23.11±5.16	1.18	20.62±25.59		
5	18	25.33±4.72	1.11	22.98±27.68		
6	19	26±4.34	0.99	23.91±28.09		
7	20	25.9±4.45	0.99	23.81±27.99		
8	20	26.95±4.50	1.00	24.84±29.06		
9	20	27.05±4.69	1.05	24.85±29.25		
10	20	26.95±4.68	1.04	24.76±29.14		
11	20	26.95±4.68	1.04	24.76±29.14		
12	20	27.87±4.35	0.97	25.81±29.89		
13	20	27.85±4.35	0.97	25.81±29.89		
14	20	27.9±4.36	0.97	25.86±29.94		
15	20	27.9±4.36	0.97	25.86±29.94		
16	20	27.9±4.36	0.97	25.86±29.94		
17	20	27.9±4.36	0.97	25.86±29.94		
18	20	27.95±4.41	0.98	25.88±30.02		
19	20	27.9±4.36	0.97	25.86±29.94		
20	20	28.8±4.15	0.92	26.86±30.74		
21	20	28.8±4.15	0.92	26.86±30.74		
22	20	28.8±4.15	0.92	26.86±30.74		
23	20	28.8±4.15	0.92	26.86±30.74		
24	20	28.8±4.15	0.92	26.86±30.74		
25	20	28.8±4.15	0.92	26.86±30.74		
26	20	28.8±4.15	0.92	26.86±30.74		
27	20	28.8±4.15	0.92	26.86±30.74		
28	20	28.8±4.15	0.92	26.86±30.74		
29	20	28.8±4.15	0.92	26.86±30.74		
30	20	28.95±4.24	0.95	26.86±30.94		
31	20	28.95±4.24	0.95	26.96±30.94		
Total	**628**	**27.15±4.8**	**0.19**	**26.78±27.53**		

**P = <0.05, **P = <0.01*

Multiple comparisons through Tukey's HDS show that results are noticeable after at least 12 sessions. The difference between the detection at time 0 and the 12th detection has an MD = -5.950 and a significance of *P* = 0.009.

Regarding the perceived quality of life compared to the MMSE, Table 3 shows a significant difference between the three MMSE classes, attributing a higher value to the third class with an M = 33.71 (± 2.452 SD) (*P* = <0.001).

Table 3: Results from the Aromatherapy Treatment Compared to the MMSE Class

MMSE Class	No. of Participant in all sessions	QoL-AD score (mean±SD)	Standard Error	I.C. 95% (Lower±Upper)	*F*	*P*
2	64	29.33±3.65	0.456	28.42±30.24	102.244	<0.001**
3	62	33.71±2.45	0.311	33.09±34.33		
4	502	26.07±4.39	0.196	25.68±26.45		
Total	**628**	**27.15±4.80**	**0.192**	**26.78±27.53**		

** *P = <0.01*

The improvement of the quality of life through aromatherapy involved all subjects who took part in the study without distinction on cognitive deficits. In fact, in Table 4 all the subjects in all the MMSE classes show significant differences when compared to each other (*P* = <0.0001). The highest average score can be seen in patients with class 3 MMSE compared with class 2 showing an MD = 4.382 and an MD = 7.644 with class 4.

Table 4: Multiple Comparisons among MMSE Classes and the QoL-AD

MMSE Class		MD	Standard Error	*P*
(I)	(J)	(I-J)		
2	3	-4.382	0.744	<0.001**
	4	3.262	0.554	<0.001**
3	2	4.382	0.744	<0.001**
	4	7.644	0.562	<0.001**
4	2	-3.262	0.554	<0.001**
	3	-7.644	0.562	<0.001**

** *P = <0.01*

Focussing the study on patients with class 4 MMSE (Table 4) showed a significant difference compared to T0 (*P* = <0.0001) with a progressive improvement up to a mean value of 28.06 (±3.958 SD) in the 31st session.

Multiple comparisons through HSD indicated that patients with a class 4 MMSE treated with aromatherapy, in the 12th session started to benefit from the treatment. Even for these patients, between T0 and the 12th session, an MD is recorded = -6.250 (*P* =<0.001).

It was noted that many patient responses to the QoL-AD questionnaire were significantly statistically correlated (Spearman rank correlation coefficient, *p* = <0.001), as shown in Table 5.

Quality of Life: AD (Interview Version for the Person Affected by Dementia)	
Items	Items statistically significantly correlated (Spearman's rank correlation coefficient) *p*=0.000
Hysical Health	Energy (ρ=0.525), Living situation (ρ=0.519), Memory (ρ=0.543), Ability to do chores around the house (ρ=0.500), Ability to do things for fun (ρ=0.547)
Energy	Physical health (ρ=0.525), Mood (ρ=0.850), Living situation (ρ=0.599), Ability to do chores around the house (ρ=0.503), Ability to do things for fun (ρ=0.535)
Mood	Energy (ρ=0.850), Living situation (ρ=0.625), Ability to do things for fun (ρ=0.538)

Living situation	Physical health (ρ=0.519), Energy (ρ=0.599), Mood (ρ=0.625), Friends (ρ=0.500), Ability to d o chores around the house (ρ=0.673), Ability to do things for fun (ρ=0.695), Life as a whole (ρ=0.556)
Memory	Physical health (ρ=0.543), Self as a whole (ρ=0.684), Ability to do things for fun (ρ=0.566)
Family	No statistically significant correlation
Marriage	No statistically significant correlation
Friends	Living situation (ρ=0.500), Ability to do things for fun (ρ=0.536)
Self as a whole	Memory (ρ=0.684)
Ability to do chores around the house	Physical health (ρ=0.500), Energy (ρ= 0.503), Living situation (ρ=0.673), Friends (ρ=0.536), Ability to do things for fun (ρ=0.815), Life as a whole (ρ=0.548)
Ability to do things f or fun	Physical health (ρ=0.547), Energy (ρ=0.535), Mood (ρ=0.538), Living situation (ρ=0.695), Memory (ρ=0.566) Ability to do chores around the house (ρ=0.815), Life as a whole ($\rho^{=0}$.572)
Money	No statistically significant correlation
Life as a whole	Living situation (ρ=0.556), Ability to do things for fun (ρ=0.572)

DISCUSSION

This study investigated aromatherapy; a complementary medicine technique that is becoming widespread. Aromatherapy was first employed for oncological uses (Wilkinson *et al.*, 2007). This technique has now been used in the field of dementias and cognitive deficits such as Alzheimer's disease through the topical application of *Melissa Officinalis* essential oil (Akhondzadeh *et al*., 2003).

The results of the study show that the participants undergoing the aromatherapy treatment with *Melissa Officinalis* oil expressed a better perception of the quality of life compared to the information collected before the beginning of the study. There was an improvement in the perception of quality of life in all patients who joined the study. While the improvements are not immediately visible, it was noted that from the 12th session a progressive improvement was observed in the scores collected through the QoL-AD questionnaire. Overall, the different degrees of severity of MMSE did not affect the results of aromatherapy treatment. The study shows that all patients treated with aromatherapy, regardless of the degree of MMSE severity, have benefited from the application of the essential oil applied through massages. There was an improvement in the quality of life, especially in patients falling in class 3 of the MMSE but also patients in class 4 of the MMSE benefited from treatment with *Melissa Officinalis*.

If the results obtained from this study are compared to scientific evidence already available in the current literature, the use of Melissa Officinalis essential oil applied through a massage has a positive effect both on the agitation levels (Wilkinson *et al.*, 2007; Li *et al.*, 2022) and above all on the levels of the quality of life, as shown in various studies in patients affected by moderate to severe Alzheimer's. The results obtained from this experiment are, therefore, in line with the study by Ballard *et al.*, carried out in 2002 (Ballard *et al.*, 2002; Watson *et al*., 2019) and with the study by Burns *et al.*, carried out in 2011 (Burns *et al.*, 2011). The positive results reported by patients arise from the use of *Melissa Officinalis* essential oil, which is inhaled and absorbed through the skin (Snow *et al.*, 2004; Watson *et al*., 2019) and by its association with the massage which promotes a state of relaxation and a consequent improvement in patients' quality of life. This was recorded at the end of each session when patients expressed their state of well-being through the answers given in the questionnaire and verbally by praising the masseur and the lovely smell of Melissa that was diffused in the environment.

Limitation

Sample size limits the generalizability and interpretation of results. Another limitation includes the small number of studies already present in current literature with a focus on aromatherapy using *Melissa Officinalis* essential oil and massage. Furthermore, the use of essential oil with a smell might not have appealed to all patients who participated in the study.

Given the small sample size and a low number of existing experimental studies on this topic in the current literature, further studies involving the use of *Melissa Officinalis* essential oil and massage for patients suffering from Alzheimer's disease should be conducted.

CONCLUSION

The results of this study show that aromatherapy using *Melissa Officinalis* essential oil applied to hands and forearms with massage leads to an improvement in the quality of life perceived by patients affected by Alzheimer's disease. Positive results were also found in patients whose scores fell in class 4 MMSE and class 3, in which the greatest improvement was recorded. The level of dementia-related impairment may also limit the reliability of patient-reported effects. There is a gap in the currently available literature on treatments using aromas and essential oils and, therefore, it is recommended that more studies will be conducted in this field.

Conflict of Interest

The authors declare that they have no conflict of interests.

ACKNOWLEDGEMENT

Authors confirm that the present research study is unfunded and that they have no conflict of interest to report.

REFERENCES

Akhondzadeh, S., Noroozian, M., Mohammadi, M., Ohadinia, S., Jamshidi, A. H., & Khani, M. (2003). Melissa officinalis extract in the treatment of patients with mild to moderate Alzheimer's disease: a double blind, randomised, placebo controlled trial. *Journal of Neurology, Neurosurgery, and Psychiatry, 74*(7), 863–866. https://doi.org/10.1136/jnnp.74.7.863

Ballard, C. G., O'Brien, J. T., Reichelt, K., & Perry, E. K. (2002). Aromatherapy as a safe and effective treatment for the management of agitation in severe dementia: the results of a double-blind, placebo-controlled trial with Melissa. *The Journal of Clinical Psychiatry, 63*(7), 553–558. https://doi.org/10.4088/jcp.v63n0703

Buckle, J. (2016). *Clinical Aromatherapy: Essential Oils in Healthcare*. 3rd Edition, Elsevier: Amsterdam, The Netherlands.

Butje, A. (2017). *The Heart of Aromatherapy. An Easy-to-Use Guide for Essential Oils*. Carlsbad, CA: Hay House Inc. California, United States.

Burns, A., Perry, E., Holmes, C., Francis, P., Morris, J., Howes, M. J., Chazot, P., Lees, G., & Ballard, C. (2011). A double-blind placebo-controlled randomized trial of Melissa officinalis oil and donepezil for the treatment of agitation in Alzheimer's disease. *Dementia and Geriatric Cognitive Disorders, 31*(2), 158–164.https://doi.org/10.1159/000324438

Clarke, S. (2008). *Handling, Safety and Practical Applications for use of Essential Oils*. Essential Chemistry for Aromatherapy, 2nd edition., Churchill Livingstone: Edinburgh, Scotland, 231- 64.

Cook, N., Lynch, J. (2008). Aromatherapy: reviewing evidence for its mechanisms of action and CNS effects. *British Journal of Neuroscience Nursing*, *4*, 595-601. http://dx.doi.org/10.12968/bjnn.2008.4.12.31963

Cooke, M., Moyle, W., Shum, D., Harrison, S., & Murfield, J. (2010). A randomized controlled trial exploring the effect of music on quality of life and depression in older people with dementia. *Journal of Health Psychology, 15*(5), 765–776. https://doi.org/10.1177/1359105310368188

Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research, 12*(3), 189–198. https://doi.org/10.1016/0022-3956(75)90026-6

Iperbole.bologna.it. (2022). Deterioramento cognitivo (disturbi della memoria, demenze): i servizi e le risorse | Servizi e Sportelli Sociali | Rete civica Iperbole [cited 15 March 2022]. https://www.iperbole.bologna.it/sportellosociale/servizi/672/70856/

Istat.it. (2022). Le Principali Cause di Morte in Italia [cited 15 March 2022]. https://www.istat.it/it/files//2014/12/Principali_cause_morte_2012.pdf

Kertapati, Y., Junaiti Sahar, Nursasi, A. Y., & Mutyah, D. (2022). The Effect of Chair Yoga with Spiritual Intervention on the Life Satisfaction of Older Adults. *The Malaysian Journal of Nursing (MJN), 14*(2). https://doi.org/10.31674/mjn.2022.v14i02.011

Li, D., Li, Y., Bai, X., Wang, M., Yan, J., & Cao, Y. (2022). The Effects of Aromatherapy on Anxiety and Depression in People With Cancer: A Systematic Review and Meta Analysis. *Frontiers in Public Health*, *10*, 853056. https://doi.org/10.3389/fpubh.2022.853056

Lim, C. K., Ching, C. W., Jun, L. J., & Yun, L. (2021). Level Of Knowledge And Attitude On Dementia Care Among Nurses. *The Malaysian Journal of Nursing (MJN), 13*(2), 3-7. https://doi.org/10.31674/mjn.2021.v13i02.001

Logsdon, R.G., Gibbons, L.E., McCurry, S.M., Teri, L. (1999). Quality of life in Alzheimer's disease: patient and caregiver reports. *Journal of Mental Health and Aging*, *5*, 21-32.

Logsdon, R. G., Gibbons, L. E., McCurry, S. M., & Teri, L. (2002). Assessing quality of life in older adults with cognitive impairment. *Psychosomatic Medicine, 64*(3), 510–519. https://doi.org/10.1097/00006842-200205000-00016

Meier, M., Unternaehrer, E., Dimitroff, S. J., Benz, A. B. E., Bentele, U. U., Schorpp, S. M., Wenzel, M., & Pruessner, J. C. (2020). Standardized massage interventions as protocols for the induction of psychophysiological relaxation in the laboratory: a block randomized, controlled trial. *Scientific Reports, 10*(1), 14774. https://doi.org/10.1038/s41598-020-71173-w

Maggio, A., Rosselli, S., & Bruno, M. (2016). Essential Oils and Pure Volatile Compounds as Potential Drugs in Alzheimer's Disease Therapy: An Updated Review of the Literature. *Current Pharmaceutical Design, 22*(26), 4011–4027. https://doi.org/10.2174/1381612822666160607065917

Nunnally J. C., & Bernstein I. H. (2010). *Psychometric Theory* (3. ed. internat. stud. ed. [Nachdr.]). Tata McGraw-Hill Ed.

Nascimento, J.C., Gonçalves, V.S.S., Souza, B.R.S., Nascimento, L.C., Carvalho, B.M.R., Ziegelmann, P.K., Goes, T.C., & Guimar˜aes, A.G. (2022). New approaches to the effectiveness of inhalation aromatherapy in controlling painful conditions: A systematic review with meta-analysis. *Complementary Therapies in Clinical Practice*, *49*, 101628. https://doi:org/10.1016/j.ctcp.2022.101628

Prince M, Comas-Herrera A, Knapp M, Guerchet M, Karagiannidou M. (2016). World Alzheimer report 2016. Improving healthcare for people living with dementia. Coverage, quality and costs now and in the future. Alzheimer's Disease International. World Alzheimer's Report.

Rubbi, I., Magnani, D., Naldoni, G., Di Lorenzo, R., Cremonini, V., Capucci, P., Artioli, G., Ferri, P. (2016). Efficacy of video-music therapy on quality-of-life improvement in a group of patients with Alzheimer's disease: a pre-post study. *Acta Biomed for Health Professions, 87*, S4, 30-37

Snow, L. A., Hovanec, L., & Brandt, J. (2004). A controlled trial of aromatherapy for agitation in nursing home patients with dementia. *Journal of Alternative and Complementary Medicine (New York, N.Y.), 10*(3), 431– 437. https://doi.org/10.1089/1075553041323696

Steele, C., Rovner, B., Chase, G. A., & Folstein, M. (1990). Psychiatric symptoms and nursing home placement of patients with Alzheimer's disease. *The American Journal of Psychiatry, 147*(8), 1049–1051. https://doi.org/10.1176/ajp.147.8.1049

Sustrami, D., Suhardiningsih, A. S., Purbasari, D. N., & Budiarti, A. (2022). A Descriptive Study of Quality of Life of Caregiver in the Family of Schizophrenia Patients. *The Malaysian Journal of Nursing (MJN), 14*(2), 124-127. https://doi.org/10.31674/mjn.2022.v14i02.020

Tabish S. A. (2008). Complementary and Alternative Healthcare: Is it Evidence-based?. *International Journal of Health Sciences, 2*(1), V–IX.

van der Watt, G., Laugharne, J., & Janca, A. (2008). Complementary and alternative medicine in the treatment of anxiety and depression. *Current Opinion in Psychiatry, 21*(1), 37–42. https://doi.org/10.1097/YCO.0b013e3282f2d814

von Elm, E., Altman, D. G., Egger, M., Pocock, S. J., Gøtzsche, P. C., Vandenbroucke, J. P., & STROBE Initiative (2007). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Lancet (London, England), 370* (9596), 1453–1457. https://doi.org/10.1016/S0140-6736(07)61602-X

Watson, K., Hatcher, D., & Good, A. (2019). A randomised controlled trial of Lavender (Lavandula Angustifolia) and Lemon Balm (Melissa Officinalis) essential oils for the treatment of agitated behaviour in older people with and without dementia. *Complementary Therapies in Medicine, 42*, 366–373. https://doi.org/10.1016/j.ctim.2018.12.016

Wilkinson, S. M., Love, S. B., Westcombe, A. M., Gambles, M. A., Burgess, C. C., Cargill, A., Young, T., Maher, E. J., & Ramirez, A. J. (2007). Effectiveness of aromatherapy massage in the management of anxiety and depression in patients with cancer: a multicenter randomized controlled trial. *Journal of Clinical Oncology : Official Journal of the American Society of Clinical Oncology, 25*(5), 532–539. https://doi.org/10.1200/JCO.2006.08.9987

Wimo, A., Guerchet, M., Ali, G. C., Wu, Y. T., Prina, A. M., Winblad, B., Jönsson, L., Liu, Z., & Prince, M. (2017). The worldwide costs of dementia 2015 and comparisons with 2010. *Alzheimer's & dementia : The Journal of the Alzheimer's Association, 13*(1), 1–7. https://doi.org/10.1016/j.jalz.2016.07.150

World Health Organization. (2013). WHO traditional medicine strategy: 2014-2023. World Health Organization

Yang, Y. P., Wang, C. J., & Wang, J. J. (2016). Effect of Aromatherapy Massage on Agitation and Depressive Mood in Individuals With Dementia. *Journal of Gerontological Nursing, 42*(9), 38–46. https://doi.org/10.3928/00989134-20160615-03

Y Ng, J., Nazir, Z., Nault, H. (2020). Complementary and alternative medicine recommendations for depression: a systematic review and assessment of clinical practice guidelines. *BMC Complementary Medicine and Therapies, 20*(1), 299. https://doi.org/10.1186/s12906-020-03085-1

Yuliastuti, C., Astuti, N. M. ., Winarno, D. D. ., Sari, M. A., & John, N. (2022). Family Support Related to Quality of Life in Diabetes Mellitus Patients with Ulcer. *The Malaysian Journal of Nursing (MJN), 14*(2). https://doi.org/10.31674/mjn.2022.v14i02.016

Zhang, Q., Sharan, A., Espinosa, S. A., Gallego-Perez, D., & Weeks, J. (2019). The Path Toward Integration of Traditional and Complementary Medicine into Health Systems Globally: The World Health Organization Report on the Implementation of the 2014-2023 Strategy. *Journal of Alternative and Complementary Medicine (New York, N.Y.), 25*(9), 869–871. https://doi.org/10.1089/acm.2019.29077.jjw