Supportive effect of body contact care with ylang ylang aromatherapy and mobile intervention team for suicide prevention: A pilot study

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Abstract

Objectives: To assess understudied, alternative suicide prevention modalities in a mental health care setting.

Methods: This was a prospective study of patients (n = 140, 68 cases and 72 controls) who were admitted to hospital or who contacted an SOS suicide crisis line for suicidal ideation or attempts. Psychiatric diagnoses (Mini-International Neuropsychiatric Interview) and intensity of anxiety/depression/suicidality (Hamilton Anxiety Rating Scale, Montgomery–Åsberg Depression Rating Scale, and Beck Scale for Suicidal Ideation) were assessed. All intervention group subjects received a crisis card with a crisis line number, interviews with psychologists or volunteers and a telephone call on days 10 to 21, then 6 months later. These subjects also had a choice between two further 4-month interventions: body contact care or mobile intervention team visits.

Results: The interventions significantly reduced the number of suicide attempts and suicide (3%) at 6 months compared with the control condition (12%). There were fewer losses to follow-up in the intervention group (7.35%) than in the control group (9.72%).

Conclusions: The results favour the implementation of integrated care and maintaining contact in suicide prevention.

Introduction

A history of suicide attempts (SAs) is considered a major risk factor for completed suicide. In a cohort study of 1,490 individuals who had made index SAs during the study period (1986–2007), 81 (5.4%) died of suicide compared with a suicide death rate in the total US population of 9.8/100,000 (World Health Organization) in the same period (2000).[1] Many strategies to prevent suicidal behaviour have been proposed and evaluated.[2] These include individual or group therapies, as well as support strategies that involve maintaining contact, such as sending letters,[3] postcards,[4] and contact in person or by telephone.[5,6] Multimodal interventions that use follow-up approaches to initial telephone calls have also been developed.[5] Two examples are the World Health Organization (WHO) Multisite Intervention Study on Suicidal Behaviours (SUPRE-MISS) programme, which involves nine phone contacts (at 1, 2, 4, 7 and 11 weeks, and 4, 6, 12 and 18 months after the index SA) and a 1-hour psychoeducation intervention (with information about suicide risks and protective factors),[7,8] and the ACTION-J programme (psychoeducation, intensive case management and telephone calls at 1, 3, 6, 12 and 18 months, with short or long intervention).[9] Drawing on the SYSCALL[6] study (three contacts: phone call at 1, 3, 13 months after hospital discharge), researchers in France developed the AlgoS[10] programme. This programme comprises an algorithm of different strategies

for suicide case management. First-time suicide attempters are provided with a 'crisis card', which contains resources such as emergency telephone numbers. SA repeaters receive a telephone call between the 10th and 21st day after the SA. Subjects who cannot be reached or who find themselves in difficulty during the telephone call are sent postcards to re-establish contact. This strategy is now used in all French territories as part of the VigilanS[11] programme (which involves use of a green crisis card, telephone contact, postcards once a month for 4 months for unsuccessfully contacted subjects and telephone contact at 6 months).

Multimodal approaches to suicide are more effective and have synergistic effects that make it possible to target individuals with different levels of vulnerability. A recent meta-analysis[12] showed a significant effect of multimodal suicide prevention interventions on completed suicide rate ($P = 0.004$) and SAs ($P < 0.001$), and meta-regression showed a significantly higher effect related to the number of intervention levels ($P = 0.032$). Some approaches have focused on increasing autonomy in subjects with a history of suicidal ideation by teaching strategies that can be used to manage the reactivation of suicidal ideation. For example, one study used safety plans in addition to structured follow-up telephone contacts.[13] The use of a Mobile Intervention Team (MIT) is a very effective method of contacting suicidal patients discharged from the emergency department.[14] MITs are increasingly used worldwide. Most US states have at least one MIT for suicidal patients; MITs are currently being developed in France and have been recommended in Australia by the Black Dog Institute (a mental health research facility).

The WHO Suicide Trends in At-Risk Territories (START) survey,[15,16] a brief intervention using psychoeducation and telephone contacts based on the WHO SUPRE-MISS survey protocol, was evaluated in French Polynesia (FP) from 2008 to 2010 for 100 case patients and 100 control patients admitted to the Central Hospital of French Polynesia (CHPF) after an SA.[15,16] The results were similar to those of the original study: a decrease in deaths by suicide (though this was not significant in FP) and no difference in SA recurrence.[15,16] A project has begun to develop a new suicide prevention protocol in FP, based on the results of the WHO START survey, the experience of suicide prevention in the community obtained by the SOS Suicide non-governmental organization since 2001, and a review of the literature on suicide prevention in the Asia Pacific region. One idea that emerged (which drew mainly from the START survey) was that more direct and proximal contacts may have a greater effect on the prevention of suicidal acts than telephone reminders. The Mental Health in General Population study (2015, unpublished) conducted in FP showed that up to 20% of the population uses traditional and magical-religious care for mental disorders. A Kenyan study[17] found that healers often treat patients with mental illnesses such as depression and current suicidal behaviour. Given this evidence, and the existence in FP of a still-strong tradition of body contact care (BCC) called *taurumi*, we chose to test this type of approach for SAs. Traditional *taurumi* care involves the use of baths and massages with coconut oil (*monoï*) enriched with various medicinal plant extracts found throughout the 'Polynesian triangle'.[18] People living in this region, which is delimited by Hawaii, Easter Island and New Zealand, share a common ethnic and cultural background.[19] Several natural substances with potentially psychotropic effects have been studied in FP. The description of the traditional

pharmacopoeia, and the encouragement of its use, has been the subject of numerous WHO publications.[20,21]

Studies in some other countries have demonstrated the effectiveness of aromatherapy (massage with essential oils such as ylang ylang, tiare (Tahitian gardenia) and sandalwood) for anxiety and depressive disorders.[22–25] In France, some types of BCC (e.g. balneotherapy) are used to treat mental health disorders such as anxiety and are recognized and paid for by the national social security system.[26]

The present study proposes a new approach that has not been previously evaluated. The approach is based on therapeutic body contact for suicide crisis. We predicted that this therapy may have several positive effects on suicidal crisis: the maintenance of social contact (via touch), provision of a therapeutic link, anxiolytic and antidepressive effects via biological pathways[27,28] and other more complex psychopathological effects (e.g., restoration of body image, narcissistic regression, freer verbal expression). It is likely that the Polynesian population would be very receptive to this approach owing to the widespread use of traditional massage in Polynesia. The main study objective was to assess the effectiveness of a BCC/MIT intervention to reduce the number of SAs in patients with suicidal ideation with or without history of SA. The second objective was to measure the effect of the BCC intervention on anxiety, mood and suicidal ideation. The research questions were as follows: Can human support in FP be strengthened by maintaining contact? In addition to psychological treatment, which measures can improve well-being, stress, anxiety, impulsivity and mood symptoms, which are the main risk factors for suicide? Which culture-based approach could be used in a suicide prevention programme?

Methods

Subjects

Subjects were assigned non-randomly to the intervention group following a team discussion and subsequent monthly team meetings. The meetings provided regular updates on the cases included in the study, and coordinated follow-up activities and other actions. The team checked regularly if all aspects of the procedure had been adhered to during the follow-up. The study design did not include randomization procedures, as we wished to attract participants receptive to BCC to reduce the number of refusals of care or dropouts. In addition, the human and financial resources (over 2 years) for this pilot study were insufficient for a randomization study, which would have been more time-consuming and expensive to carry out. A future randomization study is therefore essential to validate these preliminary results.

The control group subjects were individuals who had chosen another intervention proposed by the French Polynesian Centre for Suicide Prevention (SPC) without BCC/MIT, or refused all intervention from the SPC and opted for a treatment as usual outside the SPC. Only five subjects declined to participate in the study (two cases and three controls). The selection of individuals who have declined active treatment to serve as controls is linked to potential bias. However, we wished to get as close as possible to the real-world conditions for this care and considered the control group to be a treatment-as-usual group.

Measures

Four questionnaires were used. The first was the Mini-International Neuropsychiatric Interview (MINI) International, which uses the International Classification of Diseases (ICD)-10[29–31]

criteria to assess psychiatric disorders and suicidal risk. This questionnaire assesses the presence of criteria for 18 mental health disorders (e.g., mood and anxiety disorders, addictions, psychotic disorders, insomnia and suicide risk). Each criterion is assessed by one question. Suicidal ideation and SAs were assessed for the last month and during the lifetime, and categorized as low, moderate and high risk. Low risk was indicated by a positive response to one of the following statements: *'did you think you would be better off dead or wish you were dead in the last month?'* (O1), or *'have you wanted to harm yourself in the last month?'* (O2), or *'have you ever made a suicide attempt in your lifetime?'* (O6). Moderate risk was indicated by a positive response to the following statement: *'have you had thoughts about suicide during the last month?'* (O3) or positive responses to both O2 and O6. High risk was indicated by a positive response to the following statement *'have you made a suicide attempt in the past month?'* (O5) or positive responses to both O3 and O6.

The second questionnaire was the Montgomery–Åsberg Depression Rating Scale (MADRS),[32–34] a 10-item depression scale. A higher MADRS score indicates more severe depression, and each item yields a total possible score of 0 to 6. The overall score ranges from 0 to 60. The questionnaire comprises questions on the following symptoms: apparent sadness, reported sadness, inner tension, reduced sleep, reduced appetite, concentration difficulties, weariness, inability to feel, pessimistic thoughts and suicidal thoughts. The third questionnaire was the Hamilton Anxiety Rating Scale (HAMA).[35,36] The scale consists of 14 items that assess the severity of anxiety. Each item describes several symptoms and is rated on a scale of 0 (not present) to 4 (severe). The last questionnaire was the Beck Scale for Suicidal Ideation (BSSI),[37–39] which measures the degree of suicidality. The scale consists of

19 items rated on a scale from 0 to 2; the total possible score ranges from 0 to 38. Items are grouped into three categories: active suicidal desire, preparation and passive suicidal desire.

In this controlled trial, the number of suicides and SAs were used as the primary outcome measures for the main objective. To increase the data reliability, we checked the status (suicide, SA, or neither) of individuals contacted and also individuals who had been lost to follow-up. This information was coded using ICD codes. Systematic checks were carried out using the CHPF databases (to locate any record of emergency room admittance for SA) and coroner's records (to identify cases of death by suicide). The secondary objective, the effect of BCC, was assessed before and after care by measuring anxiety (HAMA), depression (MADRS) and suicidal ideation (BSSI).

Procedure

Body contact care (BCC). We initiated the development of the BCC approach for the prevention of suicidal crisis in FP in 2006. Pilot protocols were approved by the ethics committee of FP (CEPF Opinion n° 29 of 11 January 2007, Tahiti). During the development of the research protocol, collaborations were established with the University of French Polynesia (UPF) and the Louis Malardé Institute to select a medicinal plant used in traditional medicine that has anxiolytic psychotropic effects.

The first preliminary study (2010–2011) aimed to determine the potential use of BCC for suicidal inpatients by studying their relationships with their bodies and the effect of body treatment on suicidal ideas. The population comprised 24 patients and 27 control subjects admitted to the emergency room and hospitalized in a psychiatric department after an SA. The assessment was conducted in the CHPF

department of psychiatry using the 'Body Investment Scale' developed by Orbach and Mikulincer[40] and the BSSI. The findings showed that suicidal patients had a poor connection with their bodies and seemed promising for the reduction of suicidal ideas.

The second preliminary study (2012–2015) aimed to determine the effect of BCC on SA recurrence and associated symptoms (anxious–depressive symptoms). The sample comprised 12 patients (no controls) admitted after SAs to the CHPF emergency room or helped by the SOS Suicide Crisis line. BCC was performed in the SPC. The results showed a reduction in number of SAs, anxiety intensity, depression symptoms and suicidal thoughts (more than 50% of patients had a 50% reduction in symptom intensity). The massage protocol, which was initially designed to be solely Polynesian (*taurumi*), has been extended to other types of body treatments (ayurveda, shiatsu, osteopathy and classical physiotherapy) and standardized using *monoï* oil provided by the South Pacific Cosmetic Laboratory (Papara city, Tahiti, FP).

We added the essential oil of a traditional plant, *Cananga odorata*, to the *monoï* oil. The essential oil derived from *Cananga odorata* is ylang ylang; we chose this because *Cananga odorata* is on List A of the register of traditionally used medicinal plants issued by the National Food Security Agency[41] in France and French overseas territories. The use of these plants is not reserved for pharmacists. Extracts from traditional Polynesian plants such as tiare Tahiti (*Gardenia tahitensis*) and avaro (*Premna obtusifolia*) are used in traditional medicine to calm patients and are rich in acetylsalicylic acid. However, they have not been authorized for market release in France. The ylang ylang essential oil was prepared, purified and quantified by the UPF biochemistry laboratory (Tahiti, FP).

Ylang ylang oil was obtained by steam distillation (Clevenger apparatus; VWR International France, Fontenay-sous-Bois, France) of the freshly picked flowers of *Cananga odorata* (DC.). The oil was identified using gas chromatography (GC) and GC-mass spectrometry (Agilent Technologies France, Les Ulis, France) (DB-5, 30 m, Ø 0.25 mm, 0.25 μm; helium gas flow at 1 mL/minute; oven temperature: 0→5 minutes at 40°C, then 5→25 minutes at a rate of 12°C/minute). *Cananga odorata* essential oil mainly contains linalool (21.15%), methyl salicylate (6.32%) and methyl benzoate (5.93%). For this study, a 10% (w/w) solution of ylang ylang essential oil in authentic *monoï* (designation of origin) oil was prepared. We selected the duration of treatment (50 minutes) and the number of sessions (1 to 5). The number of massage sessions was determined based on the results of the two preliminary pilot studies, which contained 63 subjects (36 patients and 27 controls). Qualitative analysis of the subjects' responses indicated that five sessions were sufficient to demonstrate an effect on the measurement criteria (anxiety, depression, suicidal thoughts) and most subjects did not wish to extend the number of sessions. The duration of the massage sessions was determined empirically by the body therapists based on their practice (professional experience of several years). These pilot studies have been presented and discussed at international conferences in Tahiti (1st International Congress on Suicide Prevention in 2011, WHO Workshop on Epidemiological Surveillance and Suicide Prevention in 2013) and have been published.[42,43]

Mobile intervention team (MIT). The first intervention consisted of BCC or MIT, which began within 48 hours after study inclusion. Subjects received a telephone call between 10 and 21 days after the study start.

BCC/MIT was provided over a period of 4 months.

MIT was proposed as an alternative to BCC for subjects who did not wish to receive, or could not benefit from, BCC; for example, subjects who lived far from BCC sites or were reluctant to receive therapeutic touch (e.g. because of a history of sexual abuse). MIT has the advantage of providing more direct human contact than telephone calls or letters/postcards. In addition, the MIT intervention included Polynesian volunteers who provided more typically traditional support in accordance with the magical beliefs (religious or spiritual) of the local culture. The MIT comprised two caregivers (psychologist, nurse or volunteer). After initial testing of the process, between one and five visits were provided. The objectives of the MIT were to provide a contact as well as supportive psychotherapy that included problem solving, active listening and a traditional approach.

Telephone calls. Telephone follow-up contacts were made by a person with clinical experience (psychiatric nurse). During these contacts (between days 10 and 21, and 6 months later), the nurse asked subjects how they felt, whether they needed help, whether they had sought help and whether they had repeated suicidal behaviour. Although there was one call between days 10 and 21, this intervention could not evaluate the whole effect of the protocol because at that time the other types of care (BCC or MIT) had not been completed (these were administered over 4 months). This step was considered to reinforce the maintenance of contact (a close contact after a suicidal crisis is important, as suggested in other studies, such as the SYSCALL/START), but in our study it was not used for assessment. An analysis of the results for days 10 and 21 would hinder interpretation of the final results.

Control subjects received interviews only upon request, without BCC or MIT, and were contacted 6 months after their first interview.

Study implementation. The final protocol for this prospective study received approval from the *ad hoc* ethics committee of FP (CEPF Opinion n° 55 and 56 of 24 May 2012, Tahiti). Funding by the *Fondation de France* was obtained in 2015. An agreement between the Director of CHPF and the President of SPC-SOS Suicide Association was established in Papeete on 26 April 2016 to refer suicidal patients from the CHPF to the SPC for care, with accompanying documentation (signed by psychiatrists and patients). The study started on 1 May 2016 and all subjects had been enrolled by 1 May 2018. All telephone contacts ended on 1 November 2018. All patients gave written consent for participation in this controlled trial, following the usual recommendations.[44] We retrospectively registered the study with the Australian New Zealand Clinical Trials Registry (ANZCTR, registration number: 380019).

The research team comprised a psychiatrist (SA), psychologists (MR, AM, AM, NCF), a nurse coordinator (MDS, then GR), volunteers from the Suicide Crisis line (GV, AT, TB and LT), body care therapists (VG, PP, PD, FB, AP), an epidemiologist (NLN) and a statistician (GB). A chemistry researcher contributed to the selection and preparation of the oils used (TT). PF, EG, MP, SV, MS, PT, GB, GV and LJ, contributed to the design, the analysis and interpretation of data and the draft and critical revision of the study. All patients provided their written consent to participate in the protocol. The first interviews were conducted face-to-face by a qualified psychiatrist after participants' admission to the emergency or psychiatry departments, or after referral by volunteers from the SOS Suicide Crisis line.

Psychologists and volunteers then took further care of the subjects, if needed. The coordinating nurse provided telephone follow-up contacts and collected data. Appropriate care was taken in applying the treatment in case of dermatologic allergies or musculoskeletal pain.

Data analysis. The data entry and cleaning was carried out under the direction of the principal investigator (SA), by a nurse coordinator (MDS, GR) with the help of clinical psychologists (AM, MR, NCF) and double-checked by the epidemiologist (NLN). Two authors analysed the results (NLN and GB). Selected variables (age, sex, marital status, occupation, education, psychiatric disorder) were compared to determine possible differences between the two groups (intervention and controls) using the chi-squared test. Fisher's exact test was used owing to the small group sample size (less than five). The Friedman test was used to compare the scores of the same individual before and after BCC intervention. A probability level of $P \leq 0.05$ (two-sided) was considered statistically significant. We applied the Bonferroni correction to the results. We did not perform a sample size calculation, so the small number of samples may have affected the statistical significance of the results.

Results

Figure 1 shows the study flow diagram. The study included 38 men (52%) and 34 women (47%) in the control group and 29 men (47%) and 39 women (63%) in the intervention group (mean age 33.8 years for control subjects and 35.6 years for intervention subjects). Approximately 60% of subjects in the control and intervention group were married. The control group had a significantly higher level ($P = 0.011$) of secondary education (50%) than the intervention group (41%). Full-time/part-time employment levels were similar in both groups (control: 43%; intervention: 41%). More than 90% of the subjects in both groups had a diagnosis of mood disorder and 80% had anxiety disorder. All characteristics except education showed no significant between-group difference (Table 1). All subjects lived on the island of Tahiti, mainly in urban and suburban areas; there was no difference in access to the SPC. Most patients chose the BCC intervention (n = 55/68; 80%) and received five massages (n = 38/55; 69%). The mean number of BCC interventions was four per
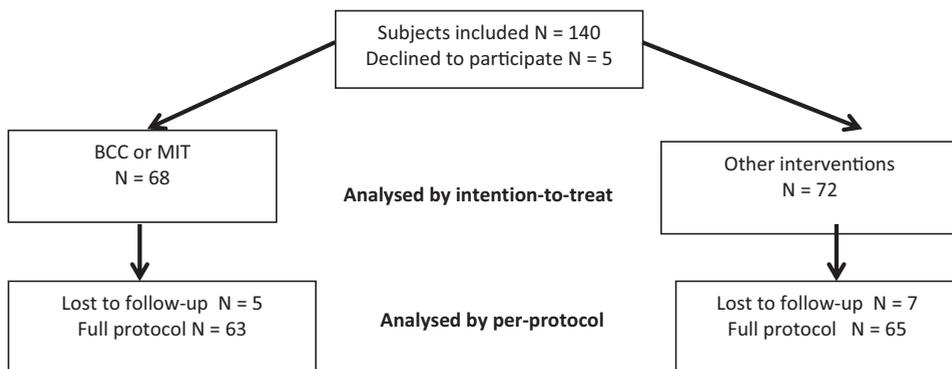

Figure 1. Flow-chart of the study.
BCC: body contact care; MIT: mobile intervention team.

patient. Most of the 13 patients who received MIT interventions received one visit (4/13; 31%) and the mean number was three per patient. The phone call was usually made between the first and the second treatment or visit.

The intention-to-treat analysis (Table 2) showed that after 6 months, the BCC/MIT reduced the number of SAs and suicide (3.00%) compared with the control condition (12.0%). As three tests were used (for SAs + suicide, SAs, and suicide), the Bonferroni correction was applied and the alpha level divided by 3 to produce a significance level of 0.017. Therefore, the obtained significance level of $P = 0.036$

Table 1. Comparison of subject characteristics in the BCC/MIT intervention group and control group

Characteristics	Control		Intervention BCC/MIT	
	$n = 72$	%	$n = 68$	%
Mean age	33.8	(SDS = 12.27)	35.6	(SDS = 13.11)
Sex				
Male	38	0.52	29	0.47
Female	34	0.47	39	0.63
Marital status				
Single	12	0.23	11	0.18
Married	31	0.60	38	0.61
Widowed	1	0.02	4	0.06
Divorced	8	0.15	8	0.13
Other	20	0.27	7	0.10
Education				
None	2	0.03	2	0.03
Primary	4	0.05	4	0.06
Secondary	36	0.50	28	0.41*
Higher (non-university)	9	0.12	10	0.15
University	16	0.22	14	0.20
Other	5	0.07	10	0.30
Occupation				
Full/part-time	29	0.40	25	0.41
Temporary	2	0.03	0	0
Unemployed	20	0.30	21	0.34
Disabled	0	0.00	0	0.00
Retired	3	0.03	2	0.03
Student	10	0.10	10	0.15
Military forces	2	0.04	0	0.00
Housekeeper	0	0.00	0	0.00
Other	6	0.08	10	0.15
Psychiatric disorder				
Alcohol use disorder	5	0.08	8	0.13
Cannabis use disorder	3	0.05	2	0.03
Psychotic disorder	2	0.03	4	0.06
Mood disorder	55	0.92	55	0.90
Anxiety/adjustment	53	0.88	48	0.80

*$P = 0.011$. Percentages may not total 100% because of rounding. BCC: body contact care; MIT: mobile intervention team; SDS: standard deviation score.

Table 2. Results of BCC/MIT intervention for suicide prevention.

Characteristics	Controls		BCC/MIT Intervention		BCC/MIT vs. Control	
	n	%	n	%	Chi^2 or Fisher's	P-value
TOTAL	72		68			
Lost to follow-up	7	9.72	5	7.35	0.25	P = 0.62
Suicide attempt and suicide	9	12.0	2	3.00	4.41	**P = 0.036**
Suicide attempt	7	1.00	2	3.00	3.61	P = 0.06
Suicide	2	3.00	0	0.00	5.73	P = 0.06

Percentages may not total 100% because of rounding. BCC: body contact care; MIT: mobile intervention team.
Note: Bold face shows *: $p < 0.05$ **: $p < 0.01$ *** : $p < 0.0001$.

Table 3. Results of suicide prevention BCC/MIT intervention on different subgroups.

Characteristics	Control			Intervention BCC/MIT			Intervention vs. Control	
	n	N	%	n	N	%	Chi^2	P-value
Final sample (Lost to follow-up excluded)	9	56	16.1	2	61	3.3	5.62	**0.02**
History of SA	4	25	16.0	1	48	2.1	4.99	**0.03**
Sex								
Male	7	31	22.6	1	28	3.6	4.54	**0.03**
Female	2	25	8.0	1	33	3.0	0.72	0.40
Age (years)								
<30	6	23	26.1	1	27	3.7	5.75	**0.02**
>30	3	33	9.1	1	34	2.9	1.13	0.29

*N: Subjects in control or intervention BCC/MIT groups. n: Subjects with SA or suicide. Percentages may not total 100% because of rounding.
BCC: body contact care; MIT: mobile intervention team; SA: suicide attempt.
Note: Bold face shows *: $p < 0.05$ **: $p < 0.01$ *** : $p < 0.0001$.

can be interpreted as a strong tendency to significance. Loss to follow-up in the BCC/MIT intervention group (7.35%) was lower than in the control group (9.72%). Further analyses were carried out on different subgroups using a per-protocol analysis (Table 3). There was a lower rate of SA and suicides in the BCC/MIT intervention group than in the control group in subjects with a history of SA (2.1% vs. 16.0%; $P = 0.03$, in men (3.6% vs. 22.6%; $P = 0.03$ and in subjects under 30 years of age (3.7% vs. 26.1%; $P = 0.02$).

Regarding measures of depression, anxiety and suicidal ideation in patients who participated only in BCC (without MIT), there was a significant reduction in scores after treatment versus before (all $P < 0.01$) (Table 4). The mean MADRS score (7.4 vs. 26) was above the minimal threshold, suggesting a major depressive episode (20–21) before the protocol and was below the depression threshold (set at 15) after the intervention. The mean HAMA score (7.96 vs. 25.79) decreased from being significantly higher than the clinically significant

Table 4. Mean MADRS, HAMA and BSSI scale scores before and after BCC.

Mean scores	Before BCC	After BCC	Friedman P-values (difference calculated individually before and after BCC)
MADRS (depression)	26	7.4	1.45×10^{-10}*
HAMA (anxiety)	25.79	7.96	3.5×10^{-8}*
BSSI (suicidal ideation)	13.1	4.72	6.9×10^{-7}*

*$P < 0.01$. MADRS: Montgomery–Åsberg Depression Rating Scale; HAMA: Hamilton Anxiety Rating Scale; BSSI: Beck Scale for Suicidal Ideation; BCC: body contact care.

anxiety threshold (set at 14) to below this threshold. The average BSSI score (4.72 vs. 13.1) also decreased between pre-protocol and post-protocol evaluation. The BSSI scores were high (reference scores 11–25) before the intervention and dropped to average after treatment (reference scores of 4–10).

No safety issues were observed with the BCC treatment.

Discussion

This study is the first to incorporate massages with *monoï* oil and ylang ylang essential oil into a suicide prevention programme. The principal objective was to assess the effectiveness of BCC/MIT interventions to reduce the number of SAs in patients with suicidal ideation with or without history of SA. The second objective was to measure the effect of a BCC intervention on anxiety, mood symptoms and suicidal ideation. The main objective of the intervention was successfully achieved: to reduce the number of suicides and SAs through maintaining contact by multimodal interventions that adopted a more holistic approach and took into account subjects' physical and cultural environments. To the best of our knowledge, there are no studies using BCC in suicide prevention, although there is evidence of the effectiveness of BCC for anxiety and depression symptoms. Treatments similar to BCC, such as spa baths,[45] are currently being tested to

reduce stress and could be adapted to suicide prevention if effective. In the AlgoS study, a medico-economic evaluation of the intervention group compared with the control group[46] showed that the number of rheumatologist and physiotherapist visits was significantly higher in the control group. This may indicate that suicidal patients who did not receive the contact intervention needed to obtain this contact in a physical way (in addition to obtaining pain relief). In a randomized controlled trial,[47] Poland et al. found that Swedish massage significantly reduced the severity of depression at weeks 4, 6 and 8 compared with no intervention and/or touch. This suggests that massage without *monoï* and ylang ylang oils may also be effective for suicidal behaviour, but this effect remains to be tested (Poland et al. did not examine suicidal behaviour). However, the evidence indicates that randomized controlled trials are needed to test whether the chemical components of *monoï* and essential oils reinforce the efficacy of BCC. Ylang ylang essential oil from FP is rich in methyl salicylate and methyl benzoate, which are good antioxidant and anti-inflammatory compounds.[48] Thus, additional studies are required to determine the optimal concentration of essential oil to use with a shorter massage time for maximum patient relaxation. Most of our subjects were satisfied with the care and asked for further BCC. It was also often necessary to offer psychotherapeutic follow-up in the longer term

(more than five sessions) after the 6 months of evaluation. The BCC effect probably decreased over time, but good responders could easily repeat this care if they needed to in the FP context.

The mean age of subjects in our study was 35.6 years for the intervention group and 33.8 years for the control group. According to the WHO (2014),[49] global suicide rates are highest in older men compared with all other demographic groups. Conversely, in FP, young people (15–24 years) show the highest suicide rates and the mean age of suicide is 34.4 years.[49] The present findings show that the therapeutic approach was more effective in younger subjects (<30 years), but it would be useful to expand this research to other age groups in FP.

The high acceptance rates (higher for women) and efficacy (higher for men) of this type of treatment may be linked to anthropological and cultural aspects of traditional therapies for well-being. The patient encounters something he/she 'knows', and rediscovers a known mode of pleasure. The expertise of caregivers is a capital that can be reinvested in modern psychiatric care and follow-up. This could lead to cooperation, rather than competition, between treatment methods. This skin-to-skin contact, this work of muscular and postural sculpture, could itself be an object of reflection and research. These aspects are akin to the practice of traditional tattooing so common in FP (and now in many other parts in the world). The practice of 'traditional' massage is now perceived as a revaluation of a common heritage.

The study limitations are related to the population and the health system in FP. The study took a long time to develop owing to little time and few research resources (e.g. no medical school) combined with a small population (which meant that subject recruitment was lengthy and sample sizes small). Research on a cultural approach to suicide prevention, which is often recommended in academic epidemiological and interventional work, has been difficult to implement with non-paramedic staff unaccustomed to the application of a scientific protocol. The methodology of this initial work on a global multimodal approach, which integrates traditional care with maintaining contact for suicidal patients, needs to be improved in subsequent studies. Additional studies with randomization and double-blind methodology are needed to conduct more rigorous investigations of the global effectiveness of this approach and, if possible, the effectiveness of each component of the intervention. The evaluation of the MIT/BCC according to SA severity, the degree of suicidal ideation (with or without suicide plans) and psychiatric conditions would be useful to refine the indications of this approach. The small sample size did not permit robust analysis of the effectiveness of MIT and BCC approaches according to psychiatric condition. Personality disorders were not assessed with the MINI, but this is an important variable that future studies need to examine. Borderline personality disorder is as frequent in the suicidal population in FP as elsewhere.

The strength of this study is its originality in involving physical therapists using traditional methods together with conventional psychotherapies to help patients keep in touch and to reduce anxiety, depression and suicidal ideation. There are no similar studies in the scientific literature. Further studies are needed to evaluate the BCC approach alone.

Conclusion

The results of the BCC/MIT intervention showed a strong tendency to a significant effect of maintaining contact on a reduction in the number of suicidal acts after 6

months and a reduction in the intensity of anxiety, depression and suicidal ideation. The findings must be validated and replicated with a larger sample and a longer study period. The small sample means that the strong trend to significance may have been obtained by chance. The significance level obtained needs to be confirmed with a larger sample using a randomized survey. The development of multicentre regional studies in culturally related countries in which traditional body care is practised (e.g. among Maoris in New Zealand and Polynesian populations in Hawaii, Tonga, Samoa or Easter Island) ought to be a priority. However, many other countries also have a widespread practice of BCC, such as Japan, China and India, and even some European countries. The acceptability of this kind of body care may be higher in countries where this type of care is provided to young people, as the population is more familiar with this care and more receptive to it. In this study, most patients chose BCC rather than MIT. Although some individuals may not have felt comfortable with receiving body treatment (e.g. because of a history of sexual abuse and psychotrauma), and so may have declined to participate in the study, the present results indicate a therapeutic effect of BCC and support its future use. However, further work on this treatment modality is needed. We recommend the implementation of integrated care programmes incorporating traditional (or less traditional) psychocorporeal care and maintaining contact for suicide prevention. The use of mental health therapies generally should also be promoted on a broader scale.

Declaration of conflicting interest

The authors declare that there is no conflict of interest.

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