

ORIGINAL RESEARCH

The Pituri Learning Circle: central Australian Aboriginal women's knowledge and practices around the use of *Nicotiana* spp. as a chewing tobacco

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ABSTRACT

Introduction: Tobacco smoking has a range of known and predictable adverse outcomes, and across the world sustained smoking reduction campaigns are targeted towards reducing individual and public risk and harm. Conversely, more than 87 million women, mostly in low- and middle-income countries, use smokeless tobacco, yet the research examining the effect of this form of tobacco exposure on women is remarkably scant. In central Australia, the chewing of wild *Nicotiana* spp., a tobacco plant, commonly known as *pituri* and *mingkulpa*, is practised by Aboriginal groups across a broad geographical area. Until recently, there had been no health research conducted on the effects of chewing *pituri*.

Methods: This article reports on one component of a multidimensional *pituri* research agenda. A narrative approach utilising the methodology of the Learning Circle was used to interview three key senior central Australian Aboriginal women representative of three large geographical language groupings. The participants were selected by a regional Aboriginal women's organisation. With the assistance of interpreters, a semistructured interview, and specific trigger resources, participants provided responses to enable an understanding of the women's ethnobotanical *pituri* knowledge and practices around the use of *pituri* within the context of Aboriginal women's lives. Data were transcribed, and by using a constant comparison analysis, emergent themes were categorised. The draft findings and manuscript were translated into the participants' language and validated by the participants.



Results: Three themes around *pituri* emerged: (a) the plants, preparation and use; (b) individual health and wellbeing; and (c) family and community connectedness. The findings demonstrated similar participant ethnobotanical knowledge and practices across the geographical area. The participants clearly articulated the ethnopharmacological knowledge associated with mixing *pituri* with wood ash to facilitate the extraction of nicotine from *Nicotiana* spp., the results of which were biochemically verified. The participants catalogued the pleasurable and desired effects obtained from *pituri* use, the miscellaneous uses of *pituri*, as well as the adverse effects of *pituri* overdose and toxicity, the catalogue of which matched those of nicotine. The participants' overarching *pituri* theme was related to the inherent role *pituri* has in the connectiveness of people to family, friends and community.

Conclusions: Central Australian Aboriginal women have a firmly established knowledge and understanding of the pharmacological principles related to the content of *Nicotiana* spp. and the extraction of nicotine from the plant. Widespread use of *Nicotiana* spp. as a chewing tobacco by Aboriginal populations in the southern, central and western desert regions of Australia is attested to by participants who assert that *everyone uses it*, with girls in these remote areas commencing use between 5 and 7 years of age. Central Australian Aboriginal people who chew *Nicotiana* spp. do not consider it to be a tobacco plant, and will strongly refute that they are tobacco users. Central Australian Aboriginal people do not consider that the Western health information regarding tobacco (as a smoked product) is applicable or aligned to their use of *pituri*. *Nicotiana* spp. users will deny tobacco use at health assessment. There is a requirement to develop and provide health information on a broader range of tobacco and nicotine products in ways that are considered credible by the Aboriginal population. Health messages around *pituri* use need to account for the dominant role that *pituri* occupies in the context of central Australian Aboriginal women's lives.

Information for readers: A consultative organisation of Aboriginal women has as a strategic intent and operational agenda the improvement of Aboriginal women's and children's health across the research region. The group seeks opportunities to enhance their knowledge based on legitimate collaborative research; accordingly, they sought to participate in a range of research activities regarding the use of *pituri* and women's health outcomes. Of particular note, the group's participants chose to be identified by name in the publication of this research activity. In this article, the term 'Aboriginal' has been chosen by the central Australian women to refer to both themselves and the Aboriginal people in their communities; 'Indigenous' has been chosen to refer to the wider Australian Aboriginal and Torres Strait Islander people. The term *Nicotiana* spp. is used when referring to the plants from a Western perspective; *pituri* is used when referring to the plants, the tobacco quid, and the practice of chewing from a general Aboriginal perspective; and *mingkulpa* is used when the participants are voicing their specific knowledge and practices.

Keywords: central Australian Aboriginal population, chewing tobacco, mingkulpa, pituri, smokeless tobacco, women.

Introduction

The mastication of tobacco (*Nicotiana* spp.) and the retention of the tobacco quid on the lips and in the mouth for the purpose of nicotine extraction is recognised as a form of smokeless tobacco (SLT) use¹. The Global Adult Tobacco Survey sample of 14 low- and middle-income countries demonstrated that this form of tobacco use is a common practice in Indigenous populations, with an estimated 87 million women in those countries aged ≥ 15 years using SLT². In addition, in several industrialised countries, SLT use is increasing³. In the 350 000 km² area of southern and western

central Australia, the chewing of wild tobacco plants, the *Nicotiana* spp., is a common practice⁴. A survey of Aboriginal people and SLT use in this region in 1986 reported 'most women ... chew in central Australia'⁵. No broad contemporary usage data exist; however, 27% of Aboriginal participants in a wider program of research examining SLT use and pregnancy and birthing outcomes reported SLT use (Ratsch A., unpublished data).

Thirty years ago, the 1986 Surgeon's General report⁶ articulated health concerns related to the use of SLT. Several country-specific research activities have examined the health consequences of SLT and specifically the effects of use during pregnancy⁷; however,



comparison of those data to the central Australian Aboriginal population's use of *Nicotiana* spp., both generally and specifically related to women, is hampered by the global variety of products described under the nomenclature of SLT, the differing production and curing methods of tobacco, the various tobacco formulations and admixtures, the differences in methods of tobacco administration, individual frequency and dose used, and the self-reported nature of use¹⁻³. In addition, the research examining the use of *Nicotiana* spp. in central Australian Aboriginal populations is in the early stages of ascertaining botanical–pharmacological, demographic and health data. Given these limitations, comparisons of the health outcomes of chewing Australian *Nicotiana* spp. to other worldwide findings would be premature.

In establishing the larger research program of botanical–pharmacological, demographic and health data, it became clear that the non-Aboriginal understanding of the Aboriginal chewing substance known as *pituri* was vastly different from that of Aboriginal peoples. Accordingly, the research question of this article emerged: ‘What do central Australian Aboriginal women understand about *Nicotiana* spp.?’ The research has three aims:

- to record and document Aboriginal women's ethnobotanical knowledge and practices related to *pituri*
- to record and document Aboriginal women's ethnopharmacological knowledge and usage of *pituri*
- to record and document *pituri* use in the social context of Aboriginal women's lives.

***Nicotiana* spp. and nicotine pharmacokinetics**

In Australia, there are 22 native species and four subspecies of *Nicotiana* widespread across the continent (Fig1)⁸. The botanical plant (*Nicotiana* spp.) and the tobacco chew (quid) are commonly, and interchangeably, referred to as *pituri* and *mingkulpa* by both Aboriginal and non-Aboriginal central Australians. *Nicotiana* spp. is primarily an annual plant, with growth and new plants dependent upon rain. The alkaloid level of *Nicotiana* spp. varies with species and environmental conditions^{4,8,9}. Nicotine is the major pharmacologically active

alkaloid, with levels in field-grown Australian species ranging from 0.6 to 18.46 mg/g dry weight^{10,11}.

Nicotine can exist as a free base or a salt. At higher pH levels, nicotine can readily cross cell membranes, including the oral/nasal, skin and respiratory surfaces, resulting in more rapid increases and higher concentrations of blood nicotine^{9,12}. SLT is often modified commercially or by users (eg with slated lime) to achieve a higher pH¹³. Central Australian Aboriginal populations use similar pharmacokinetics to modify the pH of the *pituri* quid by the addition of wood ash obtained from specific trees. *N. gossei* has a pH of 5.47, and samples of the preferred wood ash demonstrate pH values of 12.2–13.2; when ash is added to *N. gossei*, the pH of the quid increases to 10.2–11.6 (N. Moghbel, personal communication, 2015). Aboriginal people place the quid orally for mucosal absorption, and utilise other sites for transdermal absorption, most commonly behind the ear⁴.

Methods

Research development and research paradigm

People of the language groups of Ngaanyatjarra, Pitjantjatjara and Yankunytjatjara are recognised as having extensive knowledge related to *pituri*⁴ and are able to provide perspectives on *pituri* use across broad geographical regions. Discussions had taken place over a 5 year period between Aboriginal and non-Aboriginal co-authors and a consultative group of 13 senior Aboriginal women representative of the three language groups. The consultative group, as senior knowledge holders, are key informants in terms of both *pituri* and women's health.

The notion that *pituri* is a tobacco plant was avidly rejected by the women from the outset. Similarly, the notion that chewing *pituri* could have adverse health consequences was unanimously contested and rebuffed. With rare exception, the consultative group were *pituri* chewers. They were unable to reconcile the Western knowledge with their own ethnobotanical knowledge and experiences, that knowledge also being that of their mothers and grandmothers and their daughters and granddaughters.

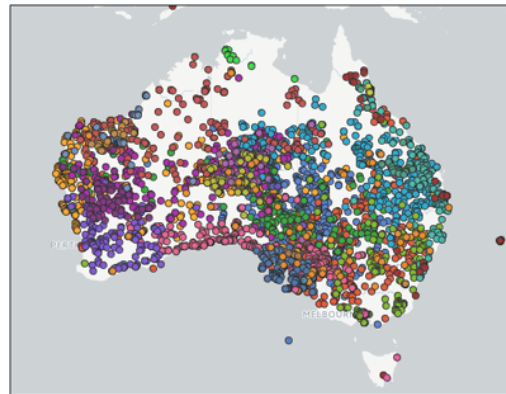


Figure 1: Dispersal areas of the 22 species and four subspecies of Australian *Nicotiana*⁸. The map illustrates the heavier dispersal through the central area of Australia, with a range of species growing throughout that region.

However, the group conduct their activities from within their own well-established evidenced-based framework, which they term an 'Aboriginal approach to action research'. This framework enables the group to consider evidence within complex cultural and social paradigms and determine strategic directions that are relevant and contextualised to that domain. The consultative group requested evidence in the form of credible Aboriginal knowledge to align with the Aboriginal Action Research framework.

A literature review¹⁴ revealed a dearth of credible *pituri* knowledge both in terms of general health and specifically related to women's health. Notably, there was an absence of Aboriginal women's voices in the literature. Accordingly, the research question 'What do central Australian Aboriginal women understand about *Nicotiana* spp.?' emerged and was advanced through the consultative group. The research objective was to contextualise Aboriginal women's ethnopharmacological understanding of *Nicotiana* spp. as *pituri* in parallel with non-Aboriginal ethnopharmacological understanding of *Nicotiana* spp., the outcomes of which could then be considered by the group within their Aboriginal Action Research framework.

Methodology

By utilising an adaptation of Riel's Learning Circle framework¹⁵, a research model was constructed (Fig2) where

both the learning and the leadership would be distributed; no single person would be the expert with the final say on what was, or was not, the truth, and each member of the circle would be responsible for sharing their own knowledge. This methodology would enable the recognition of the discrete ancestral and cultural reality and knowledge of each Aboriginal participant in parallel with the non-Aboriginal participant's Western knowledge.

A research proposal for the conduct of face-to-face semistructured interviews was developed and approved by the consultative group.

Within the geographical area, 22 Aboriginal dialects are spoken, and initial attempts to interview the consultative group as a cohort were hampered by this complexity and the eagerness of each member to contribute. The consultative group determined that the best way forward was for them to select a participant from each major language group to represent their knowledge. The three members chosen were *pituri* users, all strong self-advocates, and were among those most vocal in challenging the Western knowledge of *pituri* as tobacco. Data gathering was undertaken in a venue owned by the participants, and culturally adapted and respectful ethical briefing was provided prior to commencement. The Aboriginal participants were reimbursed in accordance with the National Health and Medical Research Council recommended fees for research consultants¹⁶.

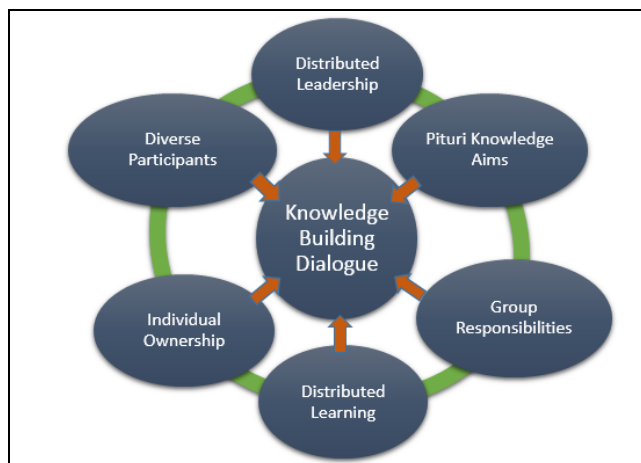


Figure 2: Learning Circle Research Model adapted from Riel¹⁵.

The cultural security of the participants was of primary importance; however, each participant requested that their responses be attributed to them by name in this publication and acknowledged as their knowledge. The participants were (by alphabetic order of the women's organisation) Maimie Butler, Ngaanyatjarra; Janet Inyika, Pitjantjatjara; and Margaret Smith, Yankunytjatjara. The dialogue was conducted over 4 hours by AR (a non-Aboriginal, tertiary qualified, health practitioner) and AM (a remote Aboriginal, tertiary qualified, organisational leader) with at least one interpreter present at all times. The dialogue used the technique of 'yarning' advocated by several authors¹⁷⁻¹⁹ as a method for successfully establishing, progressing and completing interviews with Aboriginal participants.

Resources to trigger discussion were provided by the Aboriginal participants and included:

- personal supply of *pituri* and ash
- *pituri* and ash demonstration
- *pituri* oral and post-auricular placement demonstration
- geographical maps of preferred *pituri* locations
- *pituri* harvesting and preparation diagrams.

These were augmented by non-Aboriginal trigger resources:

- 39 point semistructured interview schedule with 32 specifically focused enquiry points developed from observation, interactions with *pituri* users, and gaps in the literature
- list of nicotine desirable and adverse effects
- *Nicotiana* spp. laboratory and internet images
- *Nicotiana* spp. nicotine and metabolite data.

The dialogue commenced by gathering participant demographics and then the enquiry points on the semistructured interview schedule were raised one at a time round the circle to each participant. *Nicotiana* spp. chemical analysis data were utilised as a trigger resource, as were laboratory and internet images. In response to the illustrative triggers, the participants drew detailed images of *pituri* and how *pituri* was harvested, dried and prepared for use, and wrote the words they used for *pituri*. Each participant demonstrated quid preparation, and demonstrated oral and post-auricular quid placement. The participants sketched maps and identified locations where *pituri* was collected. In addition, the trigger list of nicotine's desired and adverse effects was compared to the participants' experiences of *pituri* use. The questions, discussion and responses were iterative, and further exploratory questions and responses arose throughout the knowledge-building dialogue. The responses were transcribed verbatim by AR, confirmed by the participant, AM and the interpreter, and clarified when necessary.



Data immersion consisted of the dialogue and reading the transcripts multiple times on multiple occasions. By using thematic analysis principles²⁰, the text was organised into categories within the interview structure and inductively constructed as the information was studied. The categories were manually organised into themes. The commonality across the themes was constructed by AR and confirmed by AM. Manuscript drafts were translated back to the participants to confirm meanings and interpretations by LR (author three), who was not involved in the initial dialogue.

Ethics approval

Ethical clearance was obtained from the Human Research Ethics Committee of the University of Queensland (HREC Number 2015001429, 6 October 2015).

Results

The Learning Circle distinguished three main themes related to the primacy of *pituri* in Aboriginal life. These themes have been labelled to connect Aboriginal and Western epistemologies:

- 'We all bin grind, grind'; *pituri* plants, preparation and use: ethnobotany
- 'Crying for mingkulpa'; health and wellbeing: ethnopharmacology
- 'Everyone very happy, we seen them plants'; family and community connectedness: ethnoculture
-

Quotes supportive of the themes are presented. The participants used the terms *pituri* and *mingkulpa* interchangeably; however, several other words and variations were used by the participants and are listed in Table 1.

'We all bin grind, grind'; pituri plants, preparation and use: ethnobotany

Hard copy images of 15 laboratory *Nicotiana* spp. were presented; however, none was identified as being 'their

mingkulpa'. The term *mingkul-mingkul* was used. (When a term is repeated, the value of the term is decreased, meaning 'a smaller object', 'not the true object', in this case referring to 'false *mingkulpa*, weak'.)

The chemical analysis data from these laboratory plants were studied by the participants; however, as the participants hadn't recognised their *mingkulpa* within the images, they were dismissive of the plants and results. 'That's that South Australian one; that's that Queensland one; that's that Western Australian one', noted Margaret (from the Northern Territory) as she scrolled through the images and read aloud the geographical information. When arriving at images labelled as being from the Northern Territory, she was slightly interested in the nicotine results, but as she didn't identify with the image, she moved on quickly.

When internet images of *Nicotiana* spp. were utilised, the respondents used the term *mingkul-mingkul* again. Only one image was considered by the group to be 'their *mingkulpa*'; this was the image of an Aboriginal man with a large *Nicotiana* spp. plant. The participants appeared to use the flowers to aid plant identification. Margaret commented several times 'that's not our one, that flower is wrong' in reference to the images of *Nicotiana* spp. with coloured flowers, and both Janet and Margaret were adamant that the internet *Nicotiana* spp. images weren't 'their *mingkulpa*', insisting on looking at 'more, more, more' in the hope of finding an exact image. Margaret was adamant that '*mingkulpa* is not tobacco', and Maimie commented that 'the leaf is bigger [on the image of the commercial tobacco plant] than our *mingkulpa*'.

The participants drew maps to identify where they thought the 'best *mingkulpa*' came from. For Janet, this was geographically south-west of Uluru in central Australia; for Maimie, this was around Fregon and Utju (Areyonga), about 240 km west of Alice Springs; and for Margaret, it was Kings Canyon, Lilla and Ukaka, south-west of Alice Springs. Margaret noted that the desert plants are 'grown in tougher natural conditions' and that plants that have too much water have 'no taste'.



Table 1: Central Australia Aboriginal names for *Nicotiana* spp.

| Central Australian Aboriginal language group | <i>Nicotiana</i> spp. nomenclature |
|--|--|
| Ngaanyatjarra | <i>Piturpa</i> <i>Mingkul-pa</i> <i>Tawal-Tawalpa</i> <i>Tjurntiwarri</i> |
| Pitjantjatjara | <i>Mingkul-pa</i> <i>Pulyantu</i> |
| Yankunytjatjara | <i>Mingkul-pa</i> <i>Piturpa</i> <i>Tjanyungu</i> |

Mingkulpa selection was similarly detailed by all participants. Janet described how the green leaves are plucked from the *mingkulpa* plants, allowing for continued growth; alternatively, some green stems with leaves are cut off, allowing continued growth from the main stem; however, she commented that if the plant is old, it will be ‘pulled out, roots and all’ to use. Maimie preferred to ‘only take the leaves’, with the stem remaining in situ; nonetheless, when ‘no leaves are left ... use the stem’. Margaret described and drew all three harvesting techniques that she used: pulling off the leaves, cutting off the stem or pulling out by the roots, and noted that in drought time *tarka*, the stems, are used.

The participants used similar principles for drying the harvest material. Janet placed the leaves directly on hot sand or a metal sheet, while Margaret placed a sheet on the ground and on which she placed the leaves and left them to dry in the sun. Collection and drying is done on a hot day and, at dusk, when the leaves are dry they are collected; Margaret commented, ‘don’t leave overnight or in plastic to dry’. The process of crushing the leaves is a group effort; Margaret described, ‘we all bin grind, grind’ as the leaves are crushed between rocks. Maimie explained that the broken and crushed leaves are then placed in a ‘bag, pillow-case or *wirra* [wooden carrying dish]’ as a storage place. Maimie recollected that ‘in the early days’ the leaves were ‘placed in a ring of emu feathers’ then ‘tied up to carry’. Janet recalled carrying these emu feather bundles containing dried *mingkulpa* on her head. The participants confirmed that small quantities

of the crushed *mingkulpa* are removed for the main supply for daily use. Contemporaneously, this personal supply is often carried in a Log Cabin or similar metal tin.

The participants described identical processes for the production of *unu*, the wood ash. Preferred trees are the *kurku parka* (*Acacia aneura*, a mulga tree), the white gum (*Eucalyptus*, a gum tree) or the bark from the *ankerne* (*Corymbia opaca*, a bloodwood tree). If a tree is used, small twigs with intact leaves are broken off and placed under the hot ashes of a campfire, the twig acting as a handle. When the leaves are dry, the twig is held over the fire while the leaves burn and their white ash is collected. Maimie described learning this process from watching her father do it. Janet noted that the taste of the ash verified if it was ‘good ash’; if it had ‘no taste’ it was ‘no good’, and in addition if it ‘doesn’t blend in and gets up the nose’ it was ‘no good’. Generally a ‘good quid’ could last 2–4 hours, and ash was added again and again to ‘get the last bit out’. Janet confirmed that ‘campfire ash, never used’. Similar to the crushed *mingkulpa*, the ash is often carried in a metal tin.

Each participant demonstrated preparing a quid by spreading a small pinch of ash on their palm and adding *mingkulpa* (Fig3), moistening it with saliva and rubbing it between the hands. Margaret noted that *mingkulpa* can be mixed with human hair or rabbit fur to hold the quid together if needed. Each participant demonstrated the quid being placed just inside the lower lip but still visible, and confirmed and



demonstrated that the quid was placed behind the ear when not in the mouth. As Maimie was positioning her ear quid, several previously stored quids fell out both from behind her ear and out of her hair, delighting her with the surprise finds. Maimie commented that 'I will hide it inside my mouth' and 'I carry a spare behind my ear'. Janet said 'we put *mingkulpa* on the lips, outside, some on the inside'. Janet said that the quid was changed when it became 'sour, worn out' or had 'no taste'. Janet and Maimie explained that they did not place the quid under a headband, armband or breast; however, Maimie recalled that in the 'early days, men' would place the quid under an armband.

All participants confirmed that when their *mingkulpa* supply was low, they would mix it with Log Cabin (and other commercial roll-your-own tobacco) or crushed cigarettes until further *mingkulpa* could be obtained. Margaret elaborated by saying 'buy cheapest smokes, break up, mix with the *mingkulpa*'; in addition, she commented that she was 'thinking of buying a cigar and breaking that up to try instead of Log Cabin'. When asked which was better, Janet commented that '*mingkulpa* tastes better' and 'makes you feel better' and that Log Cabin 'makes you spit'. Margaret supported the assertion that *mingkulpa* was better, and in addition, commented that 'rollies are too sweet and make you spit, ppp,pp,pp'. Maimie indicated that Log Cabin was used on its own 'if it had to be' and was prepared by mixing with ash in the same manner as *mingkulpa*. Margaret also commented that 'people who like Log Cabin will mix the two, and that some people don't like *mingkulpa* on its own'.

'Crying for *mingkulpa*'; health and wellbeing: ethnopharmacology

For Janet, *mingkulpa* use started around age 7 and has continued since; smoking was never taken up. As a 7–8 year old, Maimie had travelled from Warburton in Western Australia to Amata in South Australia and she 'joined in with *mingkulpa*' with the children there '... and that was it ... I still use it now'. Maimie lamented that in her home location, the plants are scarce '... WA nothing'; however, her father and grandmother were both chewers and Maimie recalls

as a child she and her family would walk from Warburton into South Australia 'looking for *mingkulpa* and then walk back again', around a 1400 km round trip to replenish 'good *mingkulpa*'. Margaret remembers that she tried cigarettes at 16–17 years old, but 'went on to *mingkulpa*'.

The participants reported that they 'like *mingkulpa*, it tastes good'. Asked to identify pleasurable *mingkulpa* effects from the trigger list of nicotine effects, the participants carefully all chose 'calmness', 'relaxation', 'improved concentration' and Margaret also added 'stress free' and that her concentration was 'a LOT better'. Using the trigger list, Janet and Maimie also considered that '*mingkulpa* woke them up'; however, Margaret said 'it doesn't wake me up', and both Margaret and Maimie said it 'helps me sleep'. Janet and Margaret said it 'stops me feeling tired'; however, Maimie said it 'didn't stop me feeling tired'. The participants agreed that using *mingkulpa* 'stops feeling thirsty', and Janet mentioned that 'little tiny children would use *mingkulpa* to save themselves from dying of thirst'. Margaret also commented that it stopped her 'feeling hungry' and Janet noted that 'hungry ones travel with it and it keeps the mouth moist'. While Maimie and Janet said for them it 'didn't stop feeling sick', Margaret felt it did 'stop feeling sick'.

Maimie and Janet said that without *mingkulpa* they 'got nervous', which Janet elaborated as 'feels like when you're hungry, you need it'. Margaret expressed this feeling as 'like a crying for *mingkulpa*'; however, she said that she was able to 'block this out'. Maimie said 'without *mingkulpa* we talk too much, we growl and get grumpy, we get headaches'. Margaret explained that when you visit 'them old people, they been crying for *mingkulpa*'. And Janet said 'on dialysis, they are hungry for *mingkulpa*'. The participants highly value 'good' *mingkulpa* described as a 'proper cheeky bugger'; with a long contented sigh, Margaret spoke about Utju *mingkulpa* as 'Cloud 9 ... I'm floating on a *mingkulpa* cloud'. Margaret recalled that on one occasion she had a supply from Utju that caused her to 'nearly fall off the chair, I had to have water, water, water, more water, it was soooo strong'. All participants reported that they go to sleep with a fresh quid in their mouth. Janet noted that 'if I sleep without *mingkulpa*, I can't sleep ... so I have it to sleep'. Margaret laughingly remarked that she will also 'wake up in the night and has a good chew'.

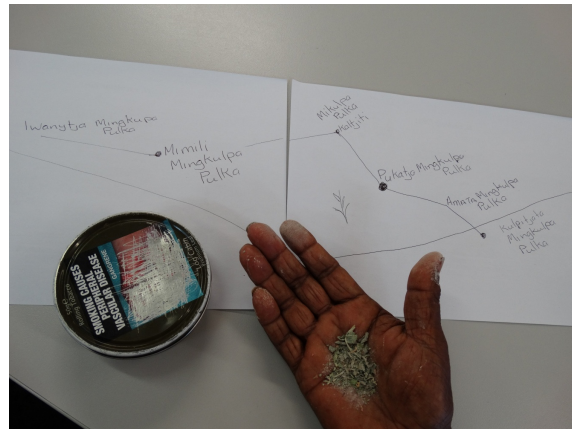


Figure 3: *Mingkulpa* being mixed with ash in the palm of the hand prior to mastication. The background sketch identifies some preferred collection locations in southern central Australia; the metal tin is a preferred *mingkulpa* and ash-carrying container. (AR own photo with permission of Janet Inyika.)

Margaret provided a sample of her normal *mingkulpa* for analysis, which demonstrated a nicotine content of 12.4 mg/g of dry leaf. Wood ash from the specific trees favoured by central Australian Aboriginal people in the preparation of *pituri* confirmed their high pH level with the pH ranging from 11.6 to 13.7 (N. Moghbel, personal communication, January 2016). An admixture of *Nicotiana* spp. and wood ash supported the premise that the addition of wood ash would increase the pH of the *pituri* quid. A sample of *N. gossei* in distilled water had a pH of 5.5 and when mixed with an equal amount of the preferred wood ash, the pH of the quid was in the range 10.2–11.9 (N. Moghbel, personal communication, January 2016).

When asked about swallowing the saliva produced when chewing or if it is spat out, Margaret commented that she ‘doesn’t swallow the spit, I just move the *mingkulpa* around’. Janet added that sometimes it is swallowed, but if it is, ‘it burns’. Maimie confirmed this and said that ‘lot of water’ needs to be drunk if you ‘swallow by accident’. Margaret supported these claims, saying she ‘nearly choked when I swallowed once’.

Margaret insisted that the ‘plant is pure, no chemicals’, and is good for you; however, from the trigger list of adverse

nicotine effects, the participants rapidly identified ‘sick from *mingkulpa*’ signs and symptoms, which Margaret said were experienced more ‘in renal dialysis patients’ and that ‘normal people not so much’.

Mingkulpa overdose and toxicity signs and symptoms as reported by participants include:

- ‘Really weak’
- ‘Feel sick’
- ‘Have chest pain, burning chest’
- ‘Headache’
- ‘Drowsy’
- ‘Heart is weak’
- ‘Can’t see properly’
- ‘My heart got burn’
- ‘Heart is irregular’
- ‘Confused’
- ‘Vomit’
- ‘Lie down and feel like you’re spinning’
- ‘Dizzy’
- ‘Really sleepy’
- ‘Fall on the ground and lie there’.

Margaret denied ever being sick from *mingkulpa*, ‘it keeps me healthy’. Janet explained that ‘when I eat this dry *mingkulpa* –



strong *mingkulpa* – it gives me a headache, but that’s what everyone likes ... if it gives me a headache then it is a good strong one’. Maimie commented that ‘when you use *mingkulpa* for the first time you get sick ... HM [an acquaintance] was ended up sleeping all day long’. Margaret added ‘hiccoughing’ as a side effect, and in addition commented that non-*mingkulpa* users would say ‘serves you right’ in reference to the sneezing and coughing that was induced in users as the powdered *mingkulpa* flies up from grinding *mingkulpa*. Margaret noted that ‘cigarettes are made by white people and added sugar and chemicals’ and that ‘Kungka eat rollies now Log Cabin has stopped’.

Health uses of *mingkulpa*: The participants reported that wet *mingkulpa* was used on the skin in the treatment of ringworms, and in addition, Margaret said that the wet *mingkulpa* was used for ‘bullant bite, yellow ant, itchy grub, caterpillar and spider bites’ as well as ‘scabies in hair’ and ‘skin sores’. Janet confirmed these uses, adding ‘snake bite or scorpion ... cut out the poison with a stone flake and put on *mingkulpa*’. Margaret recalled that as a child she had ‘lots of insects bites and my mother she used lots of *mingkulpa* green leaves, grind, grind, always add the ash, wet leaf’, and ‘put this on my skin to stop the pain’. Janet added ‘*mingkulpa* for the spear wounds, rubbing it one, then they’d travel long distances’. In contrast, Maimie commented that it ‘was too precious to use for anything else’, implying that *mingkulpa* was not willingly spared in her community for non-chewing purposes.

‘Everyone very happy, we seen them plants’; family and community connectedness: ethnoculture

Mingkulpa is a highly desired commodity, not just for its pharmacological effects. It holds a central role in the connectiveness of Aboriginal people to each other, their earthly place and their place in the cosmos; it secures for them individual and community happiness and contentment. Maimie stood up and passionately declared, and Janet and Margaret firmly endorsed, that:

*for Anangu, mingkulpa was,
and is,
and will be,
a source of life*

Maimie commented that after a recent fire followed by rain, ‘the *mingkulpa* came up everywhere, so everyone was there for it’. Janet enthusiastically noted that ‘everyone very happy, we seen them plants’; for Aboriginal people to ‘share [the plants] with people, make them happy’. Margaret explained that ‘to show respect for the older people’ and in observation of your responsibilities, ‘people should take *mingkulpa* to the old people when they visit; it makes people happy, feel connected’. The gift of *mingkulpa* between family and friends is a sign of ‘being loved’. ‘For senior people, *mingkulpa* is sacred, there is a sacredness to everything we eat’, Margaret said. However, Maimie described that *mingkulpa* bags will be hidden from view because, as is the practice in Aboriginal culture, if it is requested by anyone, it must be shared, leaving little for the family responsibilities and personal use. In response to being asked if people sell or buy *pituri* rather than simply gift it, Margaret commented ‘selling it is not ideal, it is frowned upon, but you still buy it, because you [when you’re in town] need it’. Maimie mentioned that in three bags she had bought in Alice Springs ‘they were all different, I could tell, different colour, different tastes’.

When asked ‘Who uses it?’, the participants responded ‘everyone uses it’. One participant noted that her paternal grandmother and father used *mingkulpa* and extensive travel was required and undertaken to obtain supplies. Another participant detailed that both grandmothers, mother, five aunts, both sisters and her daughter were chewers. The third participant counted both grandmothers, mother and sisters, both daughters and ‘all five granddaughters use *mingkulpa*’. In terms of a ‘rite of passage’ or rules around *mingkulpa*, the participants’ comments were similar. An older female chewer ‘would offer you some when you were [a] strong girl’; in the geographical area of the three language groups, this was about the age of 7. While the participants generally started their own *mingkulpa* use at this age, one participant noted that ‘all my grandchildren (all girls) started



chewing at 5 years old'. Another participant too points out that one granddaughter was 'chewing from age 5 years', and that 'girl in town, she was 9 and chewing'. Margaret claimed that contemporaneously, children at 5 years old are being 'fed, or ask, or steal some of the mother's *mingkulpa*'; however, 'some parents are very strict and would never allow their children to try it'.

The participants could think of no restrictions or customary regulation on *mingkulpa* use; however, Margaret wryly said, 'don't take it through Customs'. Margaret explained this comment in relation to an overseas trip where Customs viewed 'that ash was like white powder, drugs' in the metal tins.

You think because you can't see it, it's not there: In recent discussions with a range of non-Aboriginal central Australian health providers, AR had been informed that 'we don't see women chewing like we used to' or 'we don't see women chewing'. AR put this statement to the participants. All participants scoffed at this contention; 'shame', they said, or 'young ones, don't want to be seen. They put it inside their cheek so you can't see it'. Maimie noted that if you wanted to hide the *mingkulpa*, you moved it to the 'inside of the lip or behind your ear'. Margaret said that it was a 'shame job to have it outside the mouth in front of white people you didn't know'. Margaret says that she 'like[s] to protect my *mingkulpa* inside my mouth. I don't want people to see the black thing on my mouth and wonder what it is. I practised putting it in my mouth. I don't want to spoil my good lips anyway'. The participants were adamant that *pituri* use in their communities was high, and that younger Aboriginal people will re-position their quid in the presence of non-Aboriginal people as 'they don't want to be shamed'; 'you think because you can't see it, it's not there', Margaret said.

Discussion

In this research, a Learning Circle methodology framed a knowledge-building dialogue between Aboriginal and non-

Aboriginal participants that provided an opportunity for all to think in parallel dimensions.

Previous discussions with the larger consultative group had established that they identified no link between the brown shredded tobacco contained in commercial cigarettes and their green *pituri* plants. During the dialogue, images of laboratory grown plants and internet images of *Nicotiana* spp. were similarly rejected. It may have been that the laboratory plants grown under ideal temperature, light and water conditions appeared vastly different from those grown under desert conditions.

An apparent contradiction for the participants was the non-acceptance of 'their' *mingkulpa* as a tobacco plant alongside their mixing of commercial tobacco products with *mingkulpa* when in short supply. There would seem to be a realisation at some level that *mingkulpa* and commercial tobacco products have the same ability to provide desired effects, even if they aren't considered as being of similar botanical material. And in parallel contradiction, while the participants contended that *mingkulpa* was not harmful to health, they each expressed concern at the age that contemporary Aboriginal children commence using *mingkulpa*. Margaret says 'we are worried about very young children using *mingkulpa*, the parents should stop it'. In itself, this is a thought-provoking outcome from the Learning Circle, given that the participants continued to challenge the notion that *pituri* equals tobacco. However, the concern around childhood use may have been influenced by the long lead-in time to the interviews wherein the botanical nature of *pituri* had been discussed and debated multiple times with the larger consultative group.

The participants' addition of wood ash to *pituri* was a clear demonstration of applied pharmacological principles. The preferred wood ashes all have demonstrated pH levels >11.5, able to modify the *Nicotiana* spp. pH and consequently the oral and skin pH to facilitate the absorption and release of nicotine from the plant cell⁹. Many world populations use nicotine orally; however, the adjunct post-auricular positioning of the quid demonstrates the sound pharmacokinetic principles practised by the Aboriginal



women, with the site enabling the transdermal and continued absorption of nicotine through the very thin skin behind the ear⁹. These two methods of *pituri* use, however, provide for prolonged nicotine exposure, with additional exposure overnight as users sleep with a quid in situ.

Supportive evidence of the biphasic, tolerance and individual dose–response actions of nicotine was provided by the participants as they identified the effects of *mingkulpa* on themselves. Margaret’s comments regarding ‘Cloud 9 ... I’m floating on a *mingkulpa* cloud’ may be a high nicotine dose effect that can result in a narcotic-type experience²¹. Pharmacologically, nicotine overdose and toxicity have a range of signs and symptoms^{9,21}. The participants acknowledged that there were undesirable effects such as sneezing, coughing and hiccoughing, and in addition, distinctly recognised being ‘sick from *mingkulpa*’ as evidenced by the outcomes that they quickly selected from the trigger list. Clearly, they had each experienced or witnessed symptoms of nicotine toxicity.

For the Aboriginal participants, articulating the central role that *mingkulpa* has in their lives, their communities, their connection to responsibilities, and their enjoyment of life was universal. The comment from Margaret regarding buying and selling *pituri* indicates that Aboriginal people will seek out *pituri* to meet those requirements.

The participants were adamant that *mingkulpa* use in their geographical areas was high and were dismissive of the assessment of non-Aboriginal health providers who don’t see women chewing. The women used the term ‘shame’ as one reason to hide *mingkulpa*. For Aboriginal people, shame is a multifaceted, inherently cultural paradigm that Blagg²² describes as being ‘bound up with anxieties about a loss of social status, a feared mortification of a public self’. Being singled out (either favourably or unfavourably) creates anxiety and uncertainty and Aboriginal people will strive to avoid being ‘shamed’²².

In terms of health outcomes, aside from the nicotine contained in *Nicotiana* spp., other compounds within the

plant are of concern. The leaves contain a range of toxic chemicals, including carcinogenic nitrosamines that are potentially detrimental^{6,9,23}. Furthermore, the ash and its addition to the quid produce changes to the ionic base with the possibility of other compounds being produced from the mixing process. Further investigation into the health outcomes of long-term exposure is required.

Strengths and limitations

The strength of this research included the engaged participation and direction from the consultative group and the highly interactive work of the Learning Circle. The Circle utilised what Riel¹⁵ terms a ‘knowledge building dialogue’ between a ‘meeting of equals’ to establish a collective knowledge. The Circle provided all participants first-hand exposure to a research methodology, and the knowledge-based dialogue outcomes will be taken back to their respective communities, whether a remote outstation or an academic institution. The Learning Circle¹⁵ technique was insightful, and powerful, and resulted in two-way Aboriginal and non-Aboriginal learning²⁴ and across-Aboriginal group learning as each language group listened to the others’ stories. Riel¹⁵ contends that this type of enabled, inclusive dialogue supports individuals to express first-hand experiences and is central to groups developing a collective responsibility for knowledge building.

The research focus and participation was limited to women in southern and western central Australia and so may not be transferable to other groups. Additionally, authentication of the findings and the reliance on interpreters to mediate knowledge between participants and non-Aboriginal researchers may have resulted in some loss of context.

Conclusions

The Learning Circle has recorded central Australian Aboriginal women’s information on the location, harvesting, preparation and use of *Nicotiana* spp. as a chewing tobacco. The Circle established the Aboriginal women’s



ethnobotanical and ethnopharmacological knowledge around the preparation of *pituri* and the selection of ash to provide a self-administered, high concentration, nicotine delivery device. In addition, the central Australian Aboriginal women demonstrated sound ethnopharmacological knowledge of nicotine effects, overdose and toxicity.

In Australia, nicotine use as a health assessment variable is currently framed from within a Western paradigm related primarily to cigarette use; nicotine administered by other methods and formulations is not captured. Redesign of the Western health assessment tools is required to provide a wider and more inclusive approach to the assessment of nicotine use in the population. Furthermore, in central Australia, the health messages around commercial cigarettes and roll-your-own tobacco are framed from a Western perspective and are not considered by the consultative group or the participants as being applicable to their *pituri*. Contextualising health literacy information to population-specific use of tobacco and nicotine would enhance the delivery of the health messages.

Inherently, Aboriginal people communicate extensively and intensely about the matters that they see as important to them and then determine the importance to their communities and advise how best to extend the discourse between Aboriginal and Western knowledge systems. The Learning Circle has facilitated the commencement of a 'knowledge community', the learning from which can now be disseminated into both Aboriginal and Western knowledge paradigms.

Future research

For the Aboriginal participants, the Aboriginal Action Research processes of the consultative group will drive the next endeavours. For the non-Aboriginal researcher, the integration of the Aboriginal knowledge into a Western paradigm will focus on the requirement to work with central Australian women to frame credible health literacy information about *pituri* as a smokeless tobacco. In addition, the wide spread and unacknowledged use of tobacco requires

further investigation and will be conducted with and through the support of the Aboriginal consultative group.

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