Title: Exploring melanoma awareness in the Australian adult population: A cross-sectional survey

Abstract

Background: Given Australia's high UV exposure and sun-seeking habits, public awareness is critical for early melanoma diagnosis. This study aims to assess melanoma awareness in Australian adults.

Methods: An adapted Melanoma Cancer Awareness Measure (M-CAM) survey with both prompted and unprompted questions was used to assess knowledge of melanoma signs and symptoms, targeting adults over 18 years, excluding healthcare professionals.

Results: Among 390 participants, the mean number of correctly identified melanoma signs and symptoms was 3.5 out of 17 (unprompted) and 11 out of 14 (prompted). For melanoma risk factors, participants recalled an average of 3.1 items out of 21 (unprompted), and 14 out of 20 items when prompted. The most commonly identified symptoms (unprompted) were changes in the colour (72%), size (41%) and shape (34%) of an existing mole. Sun exposure was the most recognised melanoma risk factor (89%) in unprompted recall, followed by family history of melanoma (64%) and fair skin colour (47%)

Conclusion: In this Australian sample, unprompted awareness was low, even among those with melanoma history. Targeted efforts to identify sub-groups with low awareness, alongside education highlighting less common signs, may enhance early detection and improve melanoma outcomes.

Introduction

Skin cancer is one of the most common forms of cancer worldwide, with melanoma considered as the most lethal subtype (1). In 2022, over 331,000 invasive melanoma cases were diagnosed globally (2), with incidence rates projected to rise by a further 50% by 2040 (3). Epidemiological data indicates melanoma cases are disproportionately found in countries with predominately fair skin types and high Ultraviolet Radiation (UV) exposure (4), with Australia reporting the highest incidence rates.

Familiarity with one's skin and regular skin self-examination are important for early melanoma detection, as most cases are first noticed by individuals themselves. Melanoma can develop quickly, and early identification of changes in moles or new lesions significantly improves treatment outcomes (5). It was reported in the literature that compared to other cancers, individuals with melanoma often delay seeking medical attention due to limited awareness, underestimation of risk, and misattribution of symptoms to benign skin changes (6), highlighting a missed opportunity for early diagnosis (7). Encouraging both self-examination and professional skin examination and presenting rapidly to a health care service when symptoms are noted through targeted awareness campaigns is essential (8).

In the Australian context, initiatives such as the "Slip, Slop, Slap" campaign and SunSmart programs have helped educate and motivate engagement in sun protective behaviours (9, 10). Yet many past survey studies are outdated and lack the depth required to capture the complexity of current knowledge and perceptions (11). Most rely heavily on closed-ended questions, limiting insights into how effectively awareness campaigns influence active understanding and behavioural intentions. This study aims to address these gaps by evaluating melanoma awareness within the Australian population using a newly developed survey and contrasting active versus prompted recall of melanoma signs and symptoms as well as risk factors.

Methods

Population and Sampling

This online survey evaluated melanoma awareness in Australia using a convenience sample recruited via social media and university networks between October 2023 to July 2024. Eligible participants were 18 years or older and not healthcare professionals to avoid knowledge and experience bias. All participants provided informed consent prior to participation. Participation was voluntary with no incentives.

Questionnaire Development

The questionnaire was adapted from the Melanoma Cancer Awareness Measure (M-CAM), originally developed and validated by a UK research team, with a validation report currently in preparation. Items related to melanoma signs, symptoms and risk factors, were identified based on the National Institute for Health and Clinical Excellence (NICE) guidelines (12); the NHS 'Symptoms- melanoma skin cancer' website (13) and the Cancer Council Australia melanoma guidelines (14). Several items were modified to align with the Australian context. The survey assessed awareness of both common and less-recognised melanoma signs, symptoms, and risk factors. The final survey consisted of 50 questions (Supplementary Material A), with unprompted (open-ended) items presented first, followed by prompted (close-ended) items to reduce recall bias. The adapted questionnaire was piloted with consumer groups prior to data collection.

Coding

For the prompted questions, participants were presented with a list of 14 signs and symptoms and 20 risk factors related to melanoma. 'Yes' responses were scored as correct recognition (1 point) and 'No' or 'Don't know' responses scored as non-recognition (0 points). For the unprompted questions, grading criteria were established using a list of 17 warning signs and symptoms and 21 risk factors, derived from the prompted questions. To ensure a comprehensive representation of all melanoma warning signs, symptoms, and risk factors identified by participants, some items in the prompted list were further detailed into more specific components. This process led to the inclusion of three additional responses, related to lesion colour, texture, and evolution, into the existing symptom list, and age as an additional risk factor. One point was assigned for each correctly identified symptom or risk factor as per those listed in the grading criteria. Higher scores reflected better risk factor and sun-safety knowledge or behaviour. Scoring was independently performed by EH and LZ. All discrepancies were resolved through discussion to reach agreement.

Statistical Analysis

Participant characteristics were summarised using descriptive statistics. Continuous variables were expressed as median (range) or mean [standard deviation (SD)], while categorical variables were presented as proportions. Group comparisons (age, gender, education, and melanoma history) used t-tests, Mann–Whitney U, Chi-square or Wald tests as appropriate. All tests were two-tailed with $\alpha = 0.05$. Analyses were conducted in SPSS (v30.0).

Results

Participants Characteristics

A total of 390 participants completed the survey, with characteristics outlined in Table 1. The median age was 49 years (range: 18-90), with the majority being female (79%, n=308). Most participants held a bachelor's degree or higher (57%, n=221). Forty per cent had a previous melanoma diagnosis (n=157). Most participants resided in regional centres and other regional areas (72%, n=304), with sixty-one per cent (n=238) residing in the state of Queensland.

Table 1. Participant Characteristics (n=390)

	N (%)
Demographics	
Age[a] (range)	**49** (18, 90)
Gender	
Female	**308** (79)
Male	**80** (21)
Other	**2** (0.5)
Ethnic Background	
Australian	**186** (48)
English	**123** (32)

Scottish	**18** (5)
Irish	**15** (4)
German	**7** (2)
Chinese	**5** (1)
Italian	**0**
Other	**3** (0.8)
Prefer not to say	**33** (9)
Aboriginal or Torres Strait origin	
Aboriginal	**5** (1)
Torres Strait Islander	**0**
Neither	**385** (99)
Level of Education	
No school certificate or other qualification	**2** (0.5)
Primary school	**1** (0.3)
High School/ leaving certificate or equivalent	**63** (16)
Trade Certificate	**46** (12)
Advanced Diploma and Diploma	**57** (15)
Bachelor	**102** (26)
Graduate Diploma and Graduate Certificate	**40** (10)
Post Graduate Degree	**79** (20)
Have you previously been diagnosed with melanoma?	
Yes	**157** (40)
No	**231** (59)
Don’t Know	**2** (0.5)
Do you have a family history of melanoma?	
Yes	**144** (37)
No	**221** (59)
Don’t Know	**25** (6)

Skin Type	
Light, pale white skin that always burns and never tans	**76** (20)
White, fair skin that usually burns and tans with difficulty	**158** (41)
Medium, white to olive skin that sometimes mildly burns and gradually tans to olive	**123** (32)
Olive, moderate brown skin that rarely burns and tans with ease to a moderate brown	**28** (7)
Brown or dark brown skin that very rarely burns and tans very easily	**4** (1)
Black or very dark brown skin that never burns and tans very easily	**1** (0.3)
Post Code Category†	
Cities and major regional centres	**86** (28)
Regional centres and other regional areas	**304** (72)

[a]: median

†Participants were divided into two groups based on their postcode location (i.e., group 1 = cities and major regional areas [renamed metropolitan for ease of reading]; group 2 = other regional, rural, and remote areas [renamed rural for ease of reading]), as classified by the Australian Government Department of Home Affairs. website.

Melanoma Awareness

Signs and Symptoms of Melanoma

Participants provided on average 3.5 (SD=1.6) unprompted signs and symptoms of melanoma out of 17, with 3% (n=10) providing no correct responses. For prompted questions, participants on average correctly identified 11.3 (SD=2.8) out of 14 signs and symptoms, with 0.5% (n=2) scoring zero. Most participants recognised change in the shape (n=379, 97%) and size (n=370, 95%) of an existing skin lesion as possible symptoms of melanoma, while the least commonly identified signs and symptoms included a pink, dome shaped lesion (n=1, 0.3%), a skin lesion appearing like a bruise on the sole of the foot, palm or under the finger nail (n=8, 2%), and a lesion that feels firmer than the surrounding skin (n=0).

Participants with a personal history of melanoma, recalled more signs and symptoms correctly compared to participants without melanoma history [unprompted: mean 3.9(SD=1.7) vs. 3.3(SD=1.5), $p = 0.01$; prompted: 11.9 (SD=2.5) vs. 10.9 (SD=2.8), $p<0.001$]. They also were more likely to correctly identify new skin lesions (29% vs. 20%, $p = 0.035$) and lesions that were itchy or sore (45% vs. 27%, $p < 0.01$) as possible melanoma symptoms. Women recalled more melanoma signs and symptoms than men [unprompted: 3.7 (SD=1.6) vs 3.0 (SD=1.5) respectively, $p<0.001$]. No statistically significant differences were observed across age groups. Details are provided in Supplementary Table 1.

Melanoma Risk Factors

The overall mean score for identifying unprompted risk factors was 3.1 (SD=1.5) out of 21, with 0.8% (n=3) providing no correct responses. History of adult sunburn (n=7, 2%), presence of many unusual

or large moles (n=12, 3%), and a previous history of cancer (n=1, 0.3%) were rarely recalled risk factors. For prompted questions, participants on average were able to correctly identify 14 (SD=3.4) out of 20 risk factors, with only one (0.3%) participant scoring zero.

Participants with a history of melanoma correctly recalled more items than those without melanoma history [unprompted mean: 3.4 (SD=1.6) vs. 2.9 (SD=1.5), p = 0.03; prompted mean: 14.2 (SD=3.1) vs 13.5 (SD=3.5), p=0.048]. They were more likely to know that sunbed use (18% vs. 9%, p = 0.011), large numbers of moles (14% vs. 8%, p = 0.048), and previous skin cancer diagnosis (previous melanoma diagnosis: 10% vs. 2%, p<0.01; other skin cancer diagnosis: 5% vs. 1%, p = 0.03) were risk factors. Participants 50 years or older recalled more items than those younger than 50 years [3.3 (SD=1.6) vs 2.9 (SD=1.6), p=0.003]. There was no significant difference between males and females in this analysis. Details are provided in Supplementary Table 1.

Skin Checks and Self-Examination

Most participants reported a previous skin check by a health professional (n=320, 82%), and 63% (n=247) of the participants had conducted a skin self-examination within the past year. Over half of participants (n=215, 55%) were fairly or very confident they could notice a symptom of melanoma. Just over 73% (n=286) of participants would seek medical attention within two weeks if they noticed a suspicious lesion and only 3% (n=12) reported they would wait more than 3 months. Details are provided in Supplementary Table 2.

Discussion

In this cross-sectional survey of Australians, participants' unprompted awareness for the signs and symptoms of melanoma was low, especially for less commonly recognised indicators. These signs are not part of the commonly used ABCDE criteria (15) for melanoma which are mainly applicable for superficial spreading melanoma but less relevant to other subtypes of melanoma such as the nodular or amelanotic varieties. Given the lack of awareness of uncommon but often fast-growing melanoma subtypes, symptoms may be easily overlooked, as similar changes can occur due to benign skin conditions or age-related changes. Among the least recalled risk factors were several clinically important ones, including a history of adult sunburn, prior radiotherapy treatment, and a history of previous cancer. Furthermore, almost 20% of participants were only able to provide up to 2 signs and symptoms or risk factors for melanoma indicating very low awareness. Most of these individuals had no personal or family history of melanoma which may have contributed to low awareness.

Widely promoted risk factors (e.g., via Cancer Council materials) were better recognised, underscoring the value of public health education. However, future campaigns should also address less known but important signs and risks. Participants with a history of melanoma showed slightly higher awareness, aligning with findings from previous Australian studies (16). This heightened awareness likely stems from their personal experience with melanoma, and education they may have received while interacting with their health care team. Given the variations in awareness across different groups, targeted interventions may be necessary to improve the general public's understanding of the range of melanoma presentation and the risk factors (17).

Diagnostic delay can be associated with patient-related factors, such as failure to recognise early warning signs and present to a doctor (18, 19), and a lack of continued surveillance of their own skin (20). In our survey, while most participants would seek care quickly, about one-quarter would delay more than two weeks. This highlights the need for targeted education to enhance public awareness and equip individuals with the knowledge to recognise early melanoma signs. Notably, delays in seeking medical advice were primarily observed in males and younger participants. These delays may

reflect a combination of factors, such as lower perceived risk of melanoma, competing life priorities, lack of awareness of early warning signs, or assumptions that skin changes are benign. Future public health initiatives could focus on addressing these barriers through targeted awareness campaigns, educational programs for younger audiences, and strategies to engage those less likely to seek preventive care.

Limitations

A key limitation of this study is the convenience sampling. The high number of participants with a prior melanoma diagnosis—who are likely to be more knowledgeable about the disease and its risk factors— along with the predominance of older people, people with higher education and females, may have introduced bias and limited diversity. In addition, recruitment strategies such as social media may have further contributed to bias by primarily attracting individuals already interested in the topic. Despite this limited diversity we found significant differences in unprompted responses across gender and age groups, indicating that the differences in awareness might be even greater in a more representative sample. Future research should refine recruitment methods to support larger, more representative studies.

Conclusion

This study provides contemporary evidence on awareness of signs, symptoms and risk factors of melanoma that are commonly recognised and those that are less well known. There was clear disparity in unprompted recall responses and recognition between those signs included in the ABCDE criteria and those related to less common subtypes of melanoma. The study also provides some indicators for possible subgroups of the population that can benefit from public health messages and personalised education.

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