Manuscript Title: Factors associated with recall of media reports about vitamin D and sun protection

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Abstract

Objective To assess the recall of media reports about vitamin D and associated factors.

Methods Analysis of cross-sectional telephone interview data (2,001 Queensland adults, 18-70 years) on vitamin D and personal sun protection, recall of media reports and participant characteristics.

Results 83.7% of participants had heard of vitamin D, 47.5% through the media. Only 513 (25.6%) participants recalled the media content within four main themes: vitamin D is beneficial/comes from the sun (47.0%); some people aren't getting enough vitamin D, need more sun (27.9%); need to balance sun exposure and skin protection (11.5%); or other (13.6%). Only 65 of the 950 participants (6.8%) reported a change to their behaviour(s) due to the media report.

Conclusion Although the media were the main source of information about vitamin D for almost 50% of participants, recall of the content and direct effect on behaviour was low. Only a small minority recalled a balanced media report of beneficial and harmful aspects of sun exposure.

Implications Health professionals often supply media with background information. To achieve best public health practice for sun protection and vitamin D, information to foster balanced media reports should be provided.

Introduction

The established and recently proposed health effects of vitamin D,^{1, 2} the role of ultraviolet radiation (UVR) exposure for vitamin D synthesis and skin cancer development, and the interrelationship between these concepts have led to a large number of scientific³⁻⁶ and mass media reports.⁷ Mass media play an important role in informing the general public about health.⁸⁻¹¹ Media reports recommending increased UVR exposure to ensure vitamin D sufficiency may counteract public health sun protection campaigns^{12, 13} or may make the public more aware of potential negative health effects of avoiding the sun.¹⁴

The aim of this study was to describe: 1) the proportion of Queensland residents who recalled reports about vitamin D and sun protection from media sources; 2) the main contents of the recalled reports; 3) factors associated with recall, and whether media messages influenced people's behaviour.

Methods

Data for was collected by cross-sectional telephone survey in 2008 from Queensland residents aged 18-70 years (Table 1) (methods described in detail elsewhere).¹⁵ Participants were asked whether they had heard about vitamin D (yes, no, don't know), and if yes, where they heard about vitamin D (doctor, other health professional, media [newspaper, TV, magazine, radio], relative or friend, other source). Participants who answered 'through newspaper, TV, magazine, or radio' were asked to reproduce in their own words the main message of the latest media report (open-ended response) and whether they had changed their sun protective behaviour following the report (yes, no, don't know).

Qualitative and Quantitative analyses

Participants' characteristics were summarised using descriptive statistical analyses, and chi-square tests to compare those who did or did not recall a media report. Open-ended responses were coded into four common themes, and chi-square tests assessed the association between demographic, skin cancer risk factors, and attitudes and behaviours, and media themes.

Results

Of 4,446 eligible Queensland residents, 2,001 (45%) completed the survey (male=50%). Over 80% of participants (n=1675, 83.7%) had ever heard of vitamin D, and 950 (47.5%) had heard of vitamin D through media sources.

Factors associated with recall of media reports

Participants who recalled a media report about vitamin D were more likely to be female (53.4%) ($p=0.004$) (Table 1), and not currently working full-time ($p<0.001$), while there was no significant difference according to age ($p=0.07$), marital status ($p=0.17$) or education level ($p=0.29$), skin colour ($p=0.06$), depth of tanning after prolonged sun exposure ($p=0.23$), or previous history of skin cancer ($p = 0.10$). However, those with skin types that easily burned were significantly more likely to recall reports about vitamin D from the media ($p=0.001$). A significantly higher proportion of participants who did not recall a media report were uncertain about the amount of time needed in the sun in summer (18.6%) and winter (20.9%) for optimal vitamin D compared to participants who recalled a media report ($p=0.001$) (Table 1).

Recall of report content

Almost half of participants who recalled a media message (46.0%) could not replicate its content. Among participants who recalled the content (n=513), four main themes were identified: that vitamin D was important/beneficial, or that it comes from the sun (“benefit-group”) (n=241, 47.0%); that some people aren’t getting enough vitamin D and/or need more sun (“more sun-group”) (n=143, 27.9%); that there is a need to balance sun exposure to get adequate vitamin D with skin protection (“balanced-group”) (n=59, 11.5%), or another message, such as recalling an advertisement for vitamin D supplements or fortified foods (“other-group”) (n=70, 13.6%).

Factors associated with recall of report content

No significant differences between participants recalling a vitamin D media report within the four main themes were found with respect to: sociodemographic characteristics (data not shown), and a number of skin cancer related intentions and beliefs (Table 2). Significant differences were found by theme of media report recalled and agreement with the statement, ‘If I regularly protect my skin from the sun, I am in danger of not getting enough

vitamin D' ($p = 0.03$). Participants in the "more sun-group" were most likely to agree or strongly agree with this statement (43%) compared to other participants. Overall, 70% reported that they believed that they were maintaining a healthy vitamin D level, and this was higher among participants in the "balanced-group" (81.4%) compared to other participants ($p=0.04$) (Table 2).

Participants in the four groups differed significantly in their estimates of the amount of time a fair-skinned person needed to spend in the sun per day to maintain a healthy vitamin D level, both for summer ($p=0.02$) and winter ($p=0.001$) (Table 2). There were no other significant differences in health behaviours by theme (data not shown).

Changes in health behaviours

Overall, 65 of the 950 participants (6.8%) reported changing their sun protection behaviours as a direct result of the media report. The most common changes reported (multiple responses allowed) were to spend more time in the sun (24, 2.5%), stop sun protective behaviours such as hats or sunscreen (10, 1.0%), dietary change (4, 0.4%) or another change (31, 3.3%).

Discussion/Conclusions

Only 48% of participants remembered receiving a media report about vitamin D, and only 6.8% of those (or 3.3% of all participants) changed their behaviour following media reports. This is consistent with previous findings that only about 30-50% of an audience will be aware of the content of media reports, even following quite extensive campaigns.¹⁶⁻¹⁷ Recall may be lower for reports communicated via TV and radio, compared to print media, which allow for more individualised exposure time to the content.¹⁸

Independent of actual health risk, large volumes of information can amplify peoples' perception of risk,¹⁹ and the media may serve as "meaning-making institutions" rather than being merely conduits for information.²⁰ However, given that only a quarter of participants in the present study recalled the content of media messages, most reports seem only to have had a transient effect on our participants. For public health, a balanced message providing the public with information on the positive and negative aspects of sun exposure, sun protection and vitamin D would be ideal. However, such message content was identified by only 12% of participants. While media reports can help increase health awareness, the

public may misinterpret their emphasis. For example, our results indicate that a significant proportion of participants, especially those within the “benefit-group”, assumed they would need to stay in the sun for 30 minutes per day or more in order to maintain adequate levels of vitamin D, contrary to published scientific evidence and position statements.²¹

Significantly more participants recalled a media report about the health effects of vitamin D. Preference for unequivocal messages could be one of the reasons for this finding, while reports presenting pros and cons may be perceived as ambiguous and unpleasant.²²

People tend to tune in to news about diseases and conditions that they feel are personally relevant, as well those with good fit between message, recipient, and sender.²³ Accordingly, we found greater recall in people with skin prone to burning rather than tanning. Women were more likely to recall a media report compared to men, in agreement with previous findings that 80% of women use media reports for health information,²⁴ and greater awareness of vitamins, due to supplement use during pregnancy and breastfeeding.²⁵

Limitations

The response rate for the study (45%) may have led to selection bias of those more interested in sun exposure and sun protection. Telephone administration of the survey and self-reporting of behaviours may also have influenced the validity of responses given, including socially desirable answers and other common biases associated with self-assessments.²⁶ The cross-sectional nature of the study also means that it is not possible to draw conclusions about the causal nature of the associations found.

Conclusions

Media reports are an important source of information about vitamin D for participants, although recall of the content of health reports and direct effects on behaviour was low. Only a small minority recalled a balanced report of beneficial and harmful aspects of sun exposure. It will be important to increase the number of media reports providing a balanced message about vitamin D and sun protection that people can recall.

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Tables

Table 1: Demographic and skin cancer risk factors of participants who recalled or did not recall a media report about vitamin D ^a

	Recalled media reports n=950 (%)	Did not recall media reports n=1051 (%)	p-value
Sex			0.004
Male	443 (46.6)	558 (53.1)	
Female	507 (53.4)	493 (46.9)	
Age median (range)	46 (20-65)	45 (20-65)	0.072
Current work situation			<0.001
Employed full-time	510 (53.7)	602 (57.3)	
Employed part-time or casual	203 (21.4)	213 (20.3)	
Full-time home duties/home carer	98 (10.3)	47 (4.5)	
Not working	139 (14.6)	189 (18.0)	
Yearly household income before tax			0.034
<\$20,000-<\$60,000	406 (42.7)	437 (41.6)	
\$60,000-\$80,000	158 (16.6)	150 (14.3)	
More than \$80,000	268 (28.2)	289 (27.5)	
Don't know	42 (4.4)	78 (7.4)	
Refused to answer	76 (8.0)	97 (9.2)	
Skin colour			0.063
Fair	583 (61.5)	607 (57.9)	
Medium	239 (25.2)	263 (25.1)	
Olive or brown	126 (13.3)	178 (17.0)	
Skin after exposure to 30 minutes strong sun without tan or sun protection			0.001
Burn and not tan afterwards	222 (23.4)	240 (22.8)	
Burn then tan	481 (50.6)	455 (43.3)	
Tan slightly without burning	194 (20.4)	261 (24.8)	
Tan a lot without burning	46 (4.8)	84 (8.0)	
Time believed needed to be exposed to the sun to maintain a healthy vitamin D level in Queensland			
Summer			0.001
No time	111 (11.7)	120 (11.4)	
5-29 minutes	441 (46.5)	385 (37.6)	
30 minutes or more	302 (31.8)	341 (32.5)	
Don't know	96 (10.1)	195 (18.6)	
Winter			0.001
No time	59 (6.2)	56 (5.3)	
5-29 minutes	335 (35.3)	297 (28.2)	
30 minutes or more	451 (47.4)	478 (45.4)	
Don't know	105 (11.1)	220 (20.9)	

^a Totals may vary slightly due to missing values

Table 2: Knowledge, attitudes and behaviour about vitamin D among 513 participants who recalled a media report

	Media report theme				Total n=513 (%)	p-value
	“benefit- group” n=241 (%)	“more sun -group” n=143 (%)	“balanced - group” n=59 (%)	“Other group” n=70 (%)		
Intention to reapply sunscreen often enough						0.632
Agree	143 (59.3)	81 (56.6)	38 (64.4)	45 (64.3)	307 (59.8)	
Suntanned person looks healthier						0.126
Agree	91 (37.8)	59 (41.3)	17 (28.8)	34 (48.6)	201 (39.2)	
Skin cancer avoidance through skin protection						0.396
Agree	199 (82.6)	119 (83.2)	47 (79.7)	52 (74.3)	417 (81.3)	
Sun exposure leads to skin aging						0.222
Agree	231 (95.9)	142 (99.3)	56 (94.9)	68 (97.1)	497 (96.9)	
If I regularly protect my skin from the sun I am in danger of not getting enough vitamin D						0.033
Agree	86 (35.7)	61 (42.7)	18 (30.5)	16 (22.9)	181 (35.3)	
I think I am maintaining a health vitamin D level						0.037
Yes	158 (65.6)	107 (74.8)	48 (81.4)	45 (64.3)	258 (69.8)	
Time believed needed to be exposed to the sun to maintain a healthy vitamin D level in Queensland						
Summer (December-February)						0.024
No time at all	30 (13.3)	17 (12.5)	14 (25.5)	12 (18.5)	73 (15.1)	
5-10 minutes	55 (24.3)	47 (34.6)	10 (18.2)	16 (24.6)	128 (26.6)	
15-20 minutes	56 (24.8)	42 (30.9)	12 (21.8)	15 (23.1)	125 (25.9)	
30 minutes or more	85 (37.6)	30 (22.1)	19 (34.5)	22 (33.8)	156 (32.4)	
Winter (June-August)						0.001
No time at all	13 (5.9)	6 (4.5)	11 (19.6)	5 (7.9)	35 (7.4)	
5-10 minutes	25 (11.3)	27 (20.1)	3 (5.4)	10 (15.9)	65 (13.7)	
15-20 minutes	51 (23.1)	42 (31.3)	12 (21.4)	18 (28.6)	123 (25.9)	
30 minutes or more	132 (59.7)	59 (44.0)	30 (53.6)	30 (47.6)	251 (53.0)	