

Awareness, Attitude, and Practices about Some Lifestyle Factors that are Potentially Carcinogenic Among the Saudi Adult Population

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ABSTRACT

Background: Cancer is a slowly progressive disease resulting from modifiable and non-modifiable factors. There are three crucial modifiable lifestyle risk factors: passive smoking, ultraviolet radiation, and processed meat classified by the International Agency for Research on Cancer as group A carcinogens. **Aim:** To assess awareness, practice, and attitude regarding passive smoking, ultraviolet radiation, and processed meat of Saudi adult individuals in Al-Majma'ah city, Saudi Arabia.

Methodology: This is a descriptive cross-sectional community-based study in Al-Majma'ah city. A sample of 502 Saudi adult individuals was randomly selected from public places as well by using an online questionnaire. Data was entered and analysed using SPSS version 25.

Results: Awareness and practice levels regarding the three potential carcinogens were graded as excellent, good, and poor. The Awareness section's respondents' scores were (57.37%, 33.47%, and 9.16%) respectively, while in the practice section (38%, 51%, and 11%). The highest positive attitude percentage was for passive smoking (n= 365, 72.7%).

Conclusion: Generally, participants had an acceptable level of awareness, practice, and attitude. However, there are some areas in which the respondents' level was relatively low, where most of the participants had inadequate awareness and practice regarding ultraviolet radiation hazards. Moreover, approximately half of the respondents showed a negative attitude towards processed meat consumption.

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INTRODUCTION

Cancer is a slowly progressive disease caused by an abnormal overgrowth of cells and develops over several years resulting from modifiable and unmodifiable factors.¹ Globally, it is a leading cause of death, and it is estimated that 9.6 million deaths in 2018 were due to cancer.² Passive smoking, sun exposure, and consumption of processed meat are practices commonly encountered by people on a daily basis, which, according to the WHO, are classified as group 1 (carcinogenic to humans).²

Passive Smoking

Passive smoking is the integration of smoke that comes from the burning end of a cigarette and the smoke breathed out by smokers.³ Hundreds of chemicals found in second-hand smoking are toxic, and about 70 of them can cause cancer.⁴

The evidence is clear that passive smoking can cause lung cancer, as well as other types of cancer.⁵ The WHO approved that the risk of lung cancer in passive smokers is equal to the risk of lung cancer in smokers.⁶

Lung cancer is known to be fatal cancer. It is often diagnosed in late stages, where it had reached a point at which it is difficult to treat. Globally, in 2018 there was an estimation of 2.1 million new lung cancer cases and 1.8 million deaths.²

In KSA 2015, there were 416 lung cancer cases, representing 3.5% of all new cases, and it is considered the fifth most common cancer among Saudi males and the fifteenth among Saudi females.⁷

KEYWORDS:

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Sun exposure (UVR)

Overexposure to sunlight has been known to increase the risk of skin cancer (SC). It is known that both types of ultraviolet radiation (UVB and UVA) can release free radicals leading to damages to DNA, producing genetic defects or mutations that can result in skin cancer.^{8,9}

According to the WHO, approximately 2 to 3 million non-melanoma skin cancers and 132,000 melanoma skin cancers occur around the world yearly.¹⁰ 99% of non-melanoma skin cancers and 95% of melanomas are caused by overexposure to solar UVR.¹¹

Locally in Saudi Arabia, there was a total number of 338 cases of skin cancer diagnosed in 2015.⁷

Processed Meat

Processed meat is any meat that goes through specific processes like salting, curing, or smoking to enhance its flavour or improve its preservation.¹²

Sufficient evidence proved the carcinogenicity of processed meat to humans, as it is classified as Group 1 carcinogens by the International Agency for Research on Cancer (IARC) as it has a high association with the occurrence of colorectal cancer.¹³

Colorectal cancer has marked incidence and mortality rates worldwide.¹⁴ There were almost 1.8 million new cases, and 862,000 deaths in 2018 based on the World Health Organization report.²

In Saudi Arabia, there were 1,465 cases of colorectal cancer, representing 12.2% of all newly diagnosed cases in 2015 among the Saudi population. Colorectal cancer is the most common cancer among males, and the third among females.⁷

With all of that taken into consideration, our aim in this study is to measure awareness among society toward these carcinogens, which is important as it gives policymakers the opportunity to plan possible interventions, campaigns, and education. The reason behind choosing passive smoking, ultraviolet radiation, and processed meat to be discussed is that they are classified by the IARC as group A carcinogens.⁶ Also, another important reason is that lung, and colorectal cancers are two of the most common cancers in Saudi Arabia and worldwide.²

MATERIALS AND METHODS

Study design and setting:

A descriptive, cross-sectional community-based study among the adult population of AlMajmaa'h governorate in 2019-2020.

Inclusion criteria

This study involved Majma'ah-based Saudi citizens aged 20 and over, both females and males.

Exclusion criteria

Those aged less than 20 years, as well as non-Saudi were excluded.

Sampling technique

• Sample type

Calculating the clusters (neighbourhoods)

$$n = \frac{NZ^2P(1-P)}{Nd^2 + Z^2P(1-P)}$$

$$n = \frac{15(1.96)^2(0.5)(1-0.5)}{15(0.05)^2 + (1.96)^2(0.5)(1-0.5)(1-0.5)} = 14 \text{ clusters}$$

n= sample size d= confidence level.
N= study population
P= prevalence Z= standard error

N= 15 (number of neighbourhoods)

As there is no prevalence, P assumed as 0.5.

Z was calculated at 95% confidence interval (Z= 1.96).

A sample error of 5% was used (d= 0.05).

The calculated sample size (n)= 14 clusters.

Calculating the sample size for houses:

$$\frac{Z^2 \times pq}{d^2} = \frac{1.96^2 \times 0.5 \times 0.5}{0.05^2} = 384 \text{ houses.}$$

$$\frac{384}{14} \cong 27 \text{ houses}$$

• Sample type

Multistage (two-stage cluster sampling)

Stage 1: Selection of the neighborhoods:

Using probability simple random sampling to select 14 clusters using a random selection table.

Stage 2: Selection of the houses in the neighborhoods.

The study population is 300 (no. of houses in each neighbourhood).

We divided it by sampling size 27 using the formula:

$$\text{SamplingInterval} = \frac{\text{Populationsize}}{\text{sample size}^2} = \frac{300}{27} \cong 11$$

Duration of study

Six months.

Data Collection

Data was collected using a questionnaire (paper and online-based questionnaire) randomly distributed among Al-Majma'ah adults. A pilot study of 20 respondents was used to create, pre-test, and validate the survey questionnaire. The questionnaire's validity and intelligibility were evaluated by prominent medical and academic specialists. The reliability of the questionnaire was also calculated in SPSS by calculating with Cronbach alpha of 0.8 for 20 participants' data collected from the pilot study.

Study variables

Gender, age, educational level, occupation, awareness, practice, and attitude.

Data Analysis

By SPSS software program version 25.

ETHICAL CONSIDERATIONS

Ethical Approval from Majma'ah University Ethical Committee was taken before conducting the study. The study protected the confidentiality of the participants, and informed consent was taken from them before filling out the questionnaire.

RESULTS

Socio-Demographic Characteristics of the Study Population:

A total of 502 participants completed the questionnaire. 77% of them were females. The majority of the participants (47%) were aged between 20-30 years. 67.3% of the participants have either completed their university or postgraduate education. The monthly income for 182 participants was less than 5000 SAR. The remaining details are shown in (Table 1).

Awareness Score Regarding Potential Carcinogens

The total possible score for awareness ranges from 0 to 6. 46 (9.16%) participants had a score from 0 to 2 which implies a poor level of awareness, and 168 (33.47%) had a score ranging between 3 and 4 which is considered good awareness. The remaining 288 participants (57.37%) had the highest score 5 to 6 which represents excellent awareness (Figure 1).

Practice score regarding potential carcinogens:

55 (10.96%) participants had a score between 0 and 2 (with the total possible score ranging from 0 to 6). This reveals poor

Table 1: Sociodemographic data of Al-Majma'ah Saudi Adult Population

Variables	n = 502	Percent (%)
Age		
20-30	238	47.7
31-40	117	23.3
41-50	104	20.7
51-60	40	8
>60	3	0.6
Gender		
Male	113	22.5
Female	398	77.5
Marital Status		
Single	207	41.2
Married	273	54.4
Divorced	16	3.2
Widow	6	1.2
Educational Status		
Uneducated	4	0.8
Primary/ Secondary school degree	25	5.0
High school degree	125	24.9
College/Post graduate studies	338	67.3
Others	10	2.0
Occupation		
Health care worker	27	5.4
Academic career	162	32.3
Field work	27	5.4
Students	128	25.5
Others	119	23.7
Monthly Income (SAR)		
<5000	182	36.6
5000 - 10000	126	25.1
11000- 25000	115	22.9
>25000	10	2

practice regarding the aforementioned carcinogens. 256 (51%) had a score between 3 and 4 which signifies good practice, and the remaining 191 (38.05%) had excellent knowledge since their score ranged between 5 and 6 (Figure 2).

Relation Between Education and Awareness Score Regarding Potential Carcinogens

There was a significant association between participants' awareness and level of education (P= 0.017). The highest percentage for excellent awareness was clearly found in college and postgraduate participants (67.4%). More details of this relation are mentioned in (Table 2).

Relation Between Gender and Awareness Score Regarding Potential Carcinogens

Regarding overall awareness in association with gender, among 389 females, 7.2% of them had poor awareness, 31.9% had good awareness, and 60.9% had excellent awareness. A total of 113 males participated in this study, 15.9% of them had poor awareness, 38.9% had good awareness, and 45.1% had excellent awareness (Table 3). There is a significant association between gender and the level of awareness of participants (p= 0.002), which means more females showed an excellent awareness than males.

Relation Between Age and Practice Score Toward Potential Carcinogens

There was no significant association between age and practice among the participants (Table 4), (p= 0.198).

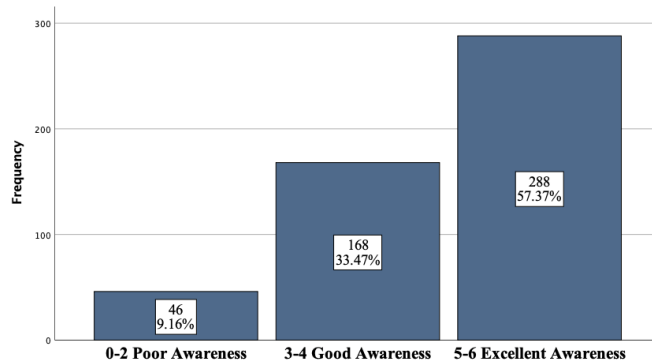


Fig. 1: Awareness score of Al-Majma'ah Saudi adult population regarding potential carcinogens

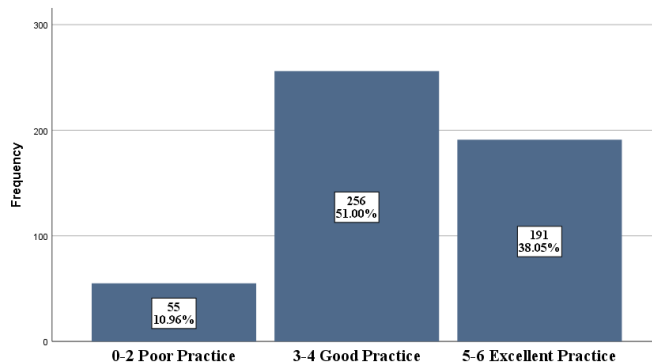


Fig. 2: Practice score of Al-Majma'ah Saudi Adult Population regarding potential carcinogens

Relation between gender and practice toward potential carcinogens:

Regarding overall practice in association with gender (Table 5), among 389 females, 6.2% had poor practice, 48.6% had good practice, and 45.2% had an excellent practice. A total of 113 males participated in this study. 27.4% of them had poor practice, 59.3% had good practice, and 13.3% had excellent practice. There is a significant association between the overall practice and gender (p0.001), which means more females showed an excellent practice than males.

Awareness, practice, and attitude highest score toward each carcinogen separately.

Regarding passive smoking, the percentages of participants who had excellent scores in awareness, practice, and attitude were 78.1%,

81.1%, and 72.7%, respectively. However, regarding UV radiation, scores were lower - 39.4% of the participant had an excellent score in awareness, 64.3% of the participants had an excellent score in attitude, and only 18.7% had an excellent score in practice.

Concerning processed meat, 67.9%, 74.7%, and 51.8% of the participants scored excellently in awareness, practice, and attitude, respectively (Table 6).

Relation between Exposure and Practice Towards Passive Smoking:

Among 502 participants, 199 were exposed to passive smoking, and the majority of them (69.35%) had an excellent practice towards passive smoking, while the remaining 30.65% had a poor practice (Figure 3).

Table 2: Awareness score of Al-Majma’ah Saudi Adult Population regarding potential carcinogens in Association with Education

Education		Awareness Score			Total
		Poor	Good	Excellent	
Uneducated	Count	2	2	0	4
	% With Awareness	4.3%	1.2%	0.0%	0.8%
Primary And Secondary School	Count	0	8	17	25
	% With Awareness	0.0%	4.8%	5.9%	5.0%
High School	Count	11	43	71	125
	% With Awareness	23.9%	25.6%	24.7%	24.9%
College And Post-Graduate	Count	30	114	194	338
	% With Awareness	65.2%	67.8%	67.4%	67.3%
Others:	Count	3	1	6	10
	% With Awareness	6.5%	0.6%	2.1%	2.0%
Total	Count	46	168	288	502
	% With Awareness	100.0%	100.0%	100.0%	100.0%

Table 3: Association between gender and awareness toward potential carcinogens in Al-Majma’ah Saudi Adult Population

Gender	Poor Awareness Score (0-2)	Good Awareness Score (3-4)	Excellent Awareness Score (5-6)	Total
<i>Female</i>				
Count	28	124	237	389
% Within Gender	7.2%	31.9%	60.9%	100%
<i>Male</i>				
Count	18	44	51	113
% Within Gender	15.9%	38.9%	45.1%	100%
<i>Total</i>				
Count	46	168	288	502
% Within Gender	9.2%	33.5%	57.4%	100%

Table 4: Practice score of Al-Majma’ah Saudi Adult Population toward potential carcinogens in Association with Age

Poor Good	Age		Practice SCORE			Total
			Excellent			
Age	20-30	Count	34	111	93	238
		%within age	14.3%	46.6%	39.1%	100%
	31-40	Count	9	64	44	117
		%within age	7.7%	25.0%	37.6%	100%
	41-50	Count	6	60	38	104
		%within age	5.8%	57.7%	36.5%	100%
	51-60	Count	5	20	15	40
		%within age	12.5%	50%	37.5%	100%
	Over 60	Count	1	1	1	3
		%within age	33.3%	33.3%	33.3%	100%
Total	Count		55	256	191	502
		%within age	11.0%	51.0%	38.0%	100.0%

Relation Between Level of Education and Awareness Score about Passive Smoking

Half of the uneducated respondents (50%) had good awareness, and the majority of respondents with primary/secondary school education (84%) had excellent awareness. Similarly, 80% of those who went to high school had excellent awareness. Among college students and postgraduates, 78.1% had excellent awareness, and 15.1% had good awareness. Surprisingly, there was no association of significance between the level of education and awareness about the hazards of passive smoking (p= 0.086). Further details are mentioned in Table 7.

Relation between gender and attitude toward passive smoking

There is a significant difference when relating gender to passive smoking attitude, (P<0.001). The majority of females (n= 303, 77.89%) had a positive attitude towards passive smoking, and only 22.11% had a negative attitude, whereas in males, about half of them (n= 51, 45.13%) had a negative attitude (Figure 4).

Usage of Protective Tools From Ultraviolet Radiation

46% of the participants do not use any effective protective tools, 30.28% use an effective protective tool sometimes or rarely, and only 23.7% use an effective protective tool always or often. Among all the participants, 45.2% use sunscreen as a protective measure, and 15.7% use long sleeve-shirts.

Relation between Sun Exposure and Occupation

There was a significant difference between sun exposure and various types of occupations, (P<0.001). The majority of the participants reported low rates of exposure, but it was greater with those in an academic career (n= 135, 83.33%). High UV radiation exposure was found in those engaged in fieldwork and those with student status (n= 6, 22.22%, 4.69%, respectively). More details are shown in (Figure 5).

Relation between Age and Attitude Toward Processed Meat Consumption

There was a significant association between age and attitude towards processed meat, (P<0.001). More than half of the

Table 5: Association between Gender and practice toward potential carcinogens in Al-Majma'ah Saudi Adult Population

Gender	Poor practice Score (0-2)	Good Practice Score (3-4)	Excellent PRACTICE SCORE (5-6)	Total
FEMALE				
Count	24	189	176	389
%within gender	6.2%	48.6%	45.2%	100%
MALE				
Count	31	67	15	113
%within gender	27.4%	59.3%	13.3%	100%
TOTAL				
Count	55	256	191	502
%within gender	11%	51%	38%	100%

Table 6: Awareness, practice & attitude of Al-Majma'ah Saudi Adult Population toward potential carcinogens. 2020

	UV radiation	Passive smoking	Processed meat
Awareness	198 39.4%	392 78.1%	341 67.9%
Practice	94 18.7%	407 81.1%	375 74.7%
Attitude	323 64.3%	365 72.7%	260 51.8%

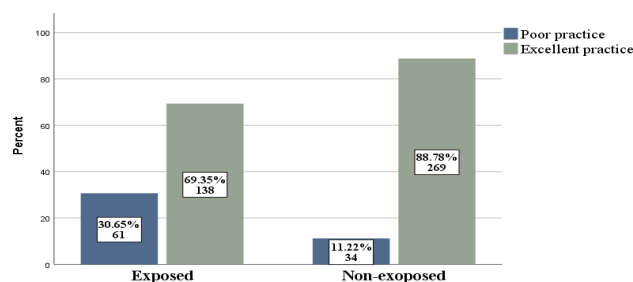


Fig. 3: Relationship between exposure and practice regarding passive smoking

Table 7: Association between level of education and awareness score about passive smoking of Al-Majma'ah Saudi Adult Population

Education	Awareness OF passive smoking			total	
	Poor	Good	Excellent		
Uneducated	Count	1	2	1	4
	%within Education	25.0%	50.0%	25.0%	100.0%
Primary and Secondary School	Count	0	4	4	25
	%within education	0.0%	16.0%	84.0%	100.0%
High school	Count	8	17	100	125
	%within education	6.4%	13.6%	80%	100.0%
COLLEGE AND Post-graduate	Count	23	51	245	338
	%within education	6.8%	15.1%	78.1%	100.0%
Others	Count	1	3	6	10
	%within education	10.0%	30.0%	60.0%	100.0%
Total	Count	33	77	392	502
	%within education	6.6%	15.3%	78.1%	100.0%

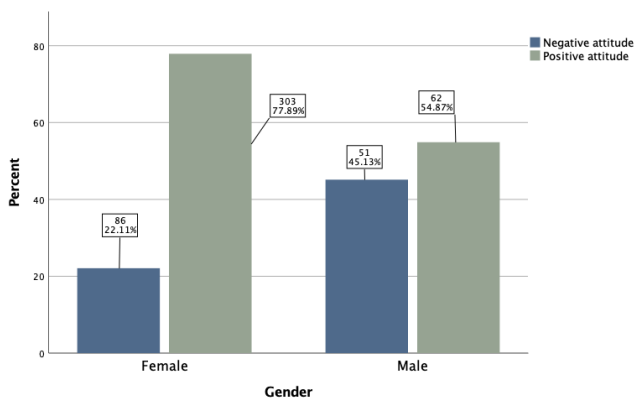


Fig. 4: Association between gender and attitude toward passive smoking as in Al-Majma’ah Saudi Adult Population

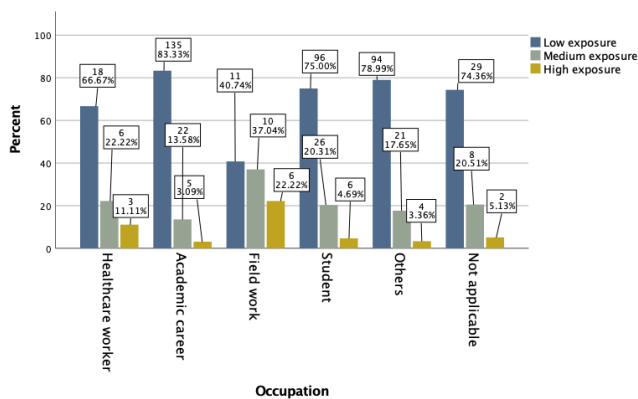


Fig. 5: Relationship between sun exposure and occupation among Al-Majma’ah Saudi Adult Population.

participants in the 20-30 age group (n= 143, 60.08%) had a negative attitude. On the other hand, (n= 73, 70.19%) of the participants in the 41-50 age group had a positive attitude (Figure 6).

DISCUSSION

Passive smoking, sun exposure, and consumption of processed meat are practices commonly encountered by people on a daily basis, which are, according to the WHO, classified as group 1 (carcinogenic to humans) [2]. Thus, this study focused on measuring the awareness, attitude, and practice of these risk factors.

Awareness: Results demonstrated that 57.37% of the respondents had the highest score for awareness (5-6) with a mean score of 4.4±1.34. 78.1% of the participants were aware that passive smoking could cause lung cancer and other chronic diseases, which was similar to that found in a study conducted in the central region of Saudi Arabia, where 75% of participants were aware of the effects of second-hand smoke on health, and 63.95% agreed that it can cause lung cancer to non-smokers [15]. Regarding awareness towards UV radiation, the results showed that 39.4% had an excellent awareness about the time when UV radiation is most harmful as well as its negative effect, which shows a high percentage compared to the study conducted in Morocco in 2014, where only 0.85% of the participants had high awareness score [16]. We asked two questions about the harmful effects of processed meat, and 67.9% of participants answered them correctly. This percentage is considered very high when compared to that of a study in the UK where only 6% knew that decreasing processed meat intake decreases the risk of colorectal cancer [17].

Practice: Results showed that 38.1% of the participants had excellent practice scores (5-6), 51% of the participants showed good practice scores (3-4), while only 11% had poor practice scores (0-2). Concerning passive smoking, 81.1% of the participants had an excellent score based on their reaction toward second-hand smoking (SHS), which was slightly higher than a survey in Jordan among employed women where 74.1% of them try to avoid the negative effect of SHS by having distance between them and the smoker [18], Moreover, in this study, 199 people were exposed to passive smoking in or out of their homes, where 69.3% of them had an excellent practice. For sun exposure practice, only 18.7% of the participants had

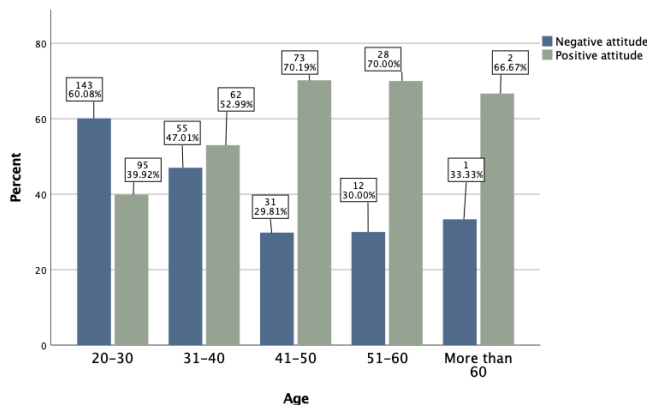


Fig. 6: Association between age and attitude toward processed meat consumption in Al-Majma’ah Saudi Adult Population.

an excellent score based on the methods of protection they use, frequency of using it, and the number of hours of daily sun exposure, while a previous study in Al- Qassim in 2010, had 57.3% of their participants with good practice [19], which is higher than the result in this study. When it comes to sun-protection tools, 23.7% of the respondents use effective protective tools always or often, 45.2% of the participants were using sunscreen; this was higher than the percentage of sunscreen users in the Al-Qassim study (8.3%) [19]. With reference to the association between sun exposure and occupation, those with the longest duration of sun exposure were field workers (22.2%), whereas the least exposure was among those engaged in an academic career (83.3%). Concerning processed meat consumption, 74.7% of the participants had excellent practice where their consumption was mostly once to twice a week, and they were trying to minimize it, which shows better practice than that seen in a survey study conducted in Saudi Arabia in 2013 about dietary habits suggesting that participants were consuming high amount of processed meat on daily basis [20].

Attitude: It was found that 72.7% of the participants had a positive attitude towards SHS, and most of them were greatly annoyed when someone smoked around them. Similarly, the results of a study conducted at King Saud Bin Abdulaziz University in Riyadh 2015, showed that 37.7% of the students were very annoyed by smokers and 44% were somewhat annoyed, which represents their positive attitude toward SHS [21]. Regarding gender, greater numbers of female participants had positive

attitudes than males (n=303, 77.89%, and n=62, 54.87% respectively), which show a significant association between gender and attitude towards passive smoking (P<0.001). Regarding attitudes to UVR around two-thirds (n=323, 64.3%) of the participants had a positive attitude towards UVR, meaning that they are concerned about protecting their skin from UVR, and they have recommended others to use protection tools. In comparison to a study conducted in Morocco (2017) it was found that 57.9% of participants who know of the relationship between UVR and skin cancer believed that using sun protection tools helps prevent skin cancer [16]. About half of the respondents (n= 250, 51.8%) had a positive attitude towards processed meat, which indicates that they care about the source of the meat they consume and the way it is prepared. Likewise, they recommended others to stop eating processed meat. This study also shows a statistically significant difference in the attitude towards processed meat consumption among different age groups (P<0.001). More than half (60.08%) of the participants aged between 20 and 30 years were not concerned about the method of preparation and the components of the meat, which reflects their negative attitude towards processed meat. Similarly, in a study done in Nottinghamshire, UK, in 2009, the oldest respondents were significantly more likely than younger people to agree that they are very fussy about where their meat came from [22].

LIMITATIONS OF THE STUDY

We were unable to collect data from the houses directly as stated in the sampling methods due to legal, and social norms. The study used a self-report questionnaire where recall bias may have affected responses. Recall and recognition are two approaches for assessing lifestyle-related knowledge and beliefs on cancer; recall is thought to underestimate knowledge and beliefs, whereas recognition is thought to overestimate them. Only one city was included in our sample strategy (mainly urban). As a result, we cannot ensure that our findings reflect the attitudes of the Saudi Arabian population.

CONCLUSION

In this study, participants had an acceptable level of awareness, practice, and attitude, with approximately more than half of the participants towards the three carcinogens. However, there are specific areas in which the respondents' level was low. The awareness and practice regarding UVR hazards were low, and almost half of the respondents showed a negative attitude towards processed meat consumption.

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REFERENCES

1. Shanmugasundaram P, Maheshwari U, Vijey, Muthukumar A, Devanandan P. Cancer awareness exposure and attitude towards

the common chemical carcinogens. *India. International Journal of Research in Pharmaceutical Sciences.* 2017; 8(1):49-53.

2. World Health Organization. International Agency for Research on Cancer. [Internet]. 2018. Available from: <https://www.who.int/cancer/PRGlocobanFinal.pdf>
3. National Center for Chronic Disease Prevention and Health promotion (US) Office on Smoking and Health, The Health Consequences of Smoking-50 Years of Progress, A Report of the Surgeon General. Atlanta (GA): Centers for Diseases Control and Prevention. 2014. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK179276/>
4. Centers for Disease Control and Prevention. Health Effects of Secondhand Smoke. [Internet].
5. 2020. Available from: https://www.cdc.gov/tobacco/data_statistics/fact_sheets/secondhand_smoke/health_effects/index.htm
6. Taylor R, Cumming R, Woodward A, Black M. Passive smoking and lung cancer: a cumulative meta-analysis. *ANZJPH.* 2007; 25(3):203-11.
7. World Health Organization. International Agency for Research on Cancer Agents classified by the IARC monographs; vol 1-124. [Internet]. 2019. Available from: <https://monographs.iarc.who.int/list-of-classifications/>
8. Ahmed A, Zeyad A, Wafa A, Fawaz A, Amal A, SA et al, Cancer Incidence Report, Saudi Health Council, National Health Information Center, Saudi Cancer Registry, Saudi Arabia. 2015.
9. de Gruijl FR. Photocarcinogenesis: UVA vs UVB. *Methods Enzymol.* 2000; 319:359-66.
10. Beani JC. [Ultraviolet A-induced DNA damage: role in skin cancer]. *Bull Acad Natl Med.* 2014;198(2):273-95.
11. World Health Organization. Helping people reduce their risks of skin cancer and cataract, A practical guide for using the global solar UV index. [Internet]. 2002. Available from: <https://www.who.int/news/item/22-07-2002-helping-people-reduce-their-risks-of-skin-cancer-and-cataract>
12. Cancer council NSW. What is UV radiation? [Internet]. 2019. Available from: <https://www.cancerCouncil.com.au/cancer-prevention/sun-protection/understanding-uv-radiation/what-is-uv-radiation/>
13. World Health Organization. International Agency for Research on Cancer IARC. monographs on the evaluation of carcinogenic risks to humans. [Internet]. 2018. Available from: <https://publications.iarc.fr/Book-And-Report-Series/Iarc-Monographs-On-The-Identification-Of-Carcinogenic-Hazards-To-Humans/Red-Meat-And-Processed-Meat-2018>
14. World Health Organization. International Agency for Research on Cancer, Q&A on the carcinogenicity of the consumption of red meat and processed meat. [Internet]. 2015. Available from: https://www.iarc.who.int/wp-content/uploads/2018/11/Monographs-QA_Vol114.pdf
15. Aykan NF. Red Meat and colorectal Cancer. *Oncol Rev.* 2015;9(1):288.
16. Gigi S, Gadah AZAA, Ghadah RGA, Hend AHA, Waad FMHA. A cross-sectional study: Exposure, Effect and Awareness of second-hand smoking in the central region of Saudi Arabia. *Research in Pharmacy and Health Sciences Publishers.* 2019;5(4):218-21.
17. Kelati A, Baybay H, Atassi M, Elfakir S, Gallouj S, Meziane M, et al. Skin cancer knowledge and attitudes in the region of Fez, Morocco: a cross-sectional study. *BMC Dermatol.* 2017;17(1):2.
18. Anderson AS, Caswell S, Macleod M, Craigie AM, Stead M, Steele RJ, et al. Awareness of Lifestyle and Colorectal Cancer Risk: Findings from the BeWEL Study. *Biomed Res Int.* 2015; 2015:871613.
19. Gharaibeh H, Haddad L, Alzyoud S, El-Shahawy O, Baker NA, Umlauf M. Knowledge, attitudes, and behavior in avoiding secondhand smoke exposure among non-smoking employed women with higher education in Jordan. *Int J Environ Res Public Health.* 2011; 11;8(11):4207-19.

20. Al Robaee AA. Awareness to sun exposure and use of sunscreen by the general population. *Bosn J Basic Med Sci.* 2010; 10(4):314-8.
21. Moradi-Lakeh M, El Bcheraoui C, Afshin A, Daoud F, AlMazroa MA, Al Saeedi M, et al. Diet in Saudi Arabia: findings from a nationally representative survey. *Public Health Nutr.* 2017; 20(6):1075-81.
22. Alanazi A, Al Enezi F, Alqahtani MM, Alshammari TF, Ansari MA, Al-Oraibi S, et al. Effects of passive smoking on students at College of Applied Medical Sciences, King Saud Bin Abdulaziz University for Health Sciences, Riyadh. *J Nat Sci Biol Med.* 2015; 6(1):100-5.
23. Clonan A, Wilson P, Swift JA, Leibovici DG, Holdsworth M. Red and processed meat consumption and purchasing behaviours and attitudes: impacts for human health, animal welfare and environmental sustainability. *Public Health Nutr.* 2015; 18(13): 2446-56.