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Research Article

KNOWLEDGE AND ATTITUDE TOWARDS THE ADVERSE REACTIONS TO IODINATED CONTRAST MEDIA AMONG THE POPULATION OF NAJRAN, SAUDI ARABIA

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Abstract:

Background: Iodinated contrast media are commonly used in radiographic investigations. However, adverse events may occur in rare cases with their use. Raising the level of knowledge of the general population towards the types, rate and severity of these events can minimize their fears.

Objective: Asses the level of knowledge and attitude of the general population of Najran city towards adverse events of iodinated contrast.

Design and Setting: The cross sectional study was the study design. Data were collected through a self-administered online questionnaire that was distributed electronically to the general population. The questionnaire included a section on socio-demographic data and a quiz assessing the level of knowledge and attitude towards the adverse events associated with using iodinated contrast media.

Statistical analysis: Data were represented in terms of frequencies and valid percentages for categorical variables. Mean, standard deviations (SD), minimum and maximum values were used to describe numerical variable. One-way ANOVA test was used to compare numerical variables between subgroups.

Results: The weighed mean score for attitude was 47.57 out of 60 points, while average score for knowledge was 3.85 out of 6 points. Females and middle-aged adults showed better knowledge compared to their male peers ($p=0.046$) compared to other age groups ($p<0.001$). Also, previous exposure to contrast showed a positive effect on attitude ($p<0.001$), while the opposite occurred with knowledge scores. Finally, employment ($p=0.001$) and high monthly income ($p=0.034$) were associated with better knowledge and attitude towards adverse events of iodinated contrast.

Conclusion: Level of knowledge of Saudi Arabian population and attitude towards the adverse events of iodinated contrast needs to be improved. Further studies are required in other regions in Saudi Arabia in order to have complete figures for the whole Saudi population.

Keywords: Iodinated contrast, Contrast media, Radiation, Radiation, Adverse events.

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INTRODUCTION:

Many types of contrast media have been utilized to enhance the quality of radiological imaging. The importance of these contrast agents has been proved through its application in real world practice globally [1]. These agents are administered through intravenous route before the investigation. After the procedure, the contrast leaves the body as it is. However, similar to any pharmaceutical product, it can have some risks although it is considered very rare [2]. Adverse effects of contrast agents can range from minor side effects to serious events that can occur rarely [3].

To minimize the risk of hazardous events, healthcare team has to be well prepared for rapid management of adverse effects arising from the administration of contrast agents [4]. This comprises a standardized protocol to deal with such cases, in addition to medications and tools that can be required in such situations [5]. In spite of that, some serious adverse events such as acute renal failure as well as delayed adverse effects may have no effective treatment. Therefore, risk of adverse events should be assessed for every patient in order to decrease the incidence of these events [6].

Adverse events are classified into three groups based on the duration between contrast administration and the occurrence of the event [7]. These include acute events (that can occur within one hour of administration), late events (occur more than one hour to one week) and very late (occur more than one week). Moreover, acute adverse events are sub classified into renal and non-renal adverse events [8]. The most common renal adverse event is contrast induced nephropathy. The incidence of contrast induced nephropathy is about 5% in individuals having moderate degree of renal impairment (15–45 ml/min) [9]. The incidence increases to 15% in those having severe renal impairment. Iodinated contrast products, and to a lower degree, gadolinium based contrast agents, can lead to renal impairment, especially in individuals with reduced renal function due to other comorbidities like diabetes mellitus, for instance [10]. As for late adverse events, skin rash is the most common side effect for iodinated contrast agent. However, late adverse events have not been recorded with magnetic resonance or ultrasound products [11].

Most of the non-radiology medical staff has poor practical exposure to the management of acute adverse events. Recent studies in Europe showed poor knowledge towards management of acute adverse events, though the figures in gulf area are not clear [12]. The situation is even worse for the general

population especially with scarcity of data, that's why awareness programs for both medical and non-medical communities are crucial to improve their knowledge regarding safety of contrast agents [13].

Therefore, the aim of this study is to explore the level of knowledge in addition to attitude and attitude of Saudi Arabian population, particularly Najran city, towards the safety and management of adverse events that may arise from the administration of contrast agents.

MATERIALS AND METHODS:**Study design:**

A cross-sectional study was carried out where an online self-developed questionnaire was distributed, via link to Google form to the general public through twitter and WhatsApp. All Saudi citizens and residents in Najran, Saudi Arabia were included in the study. A pilot study was conducted on 100 subjects to evaluate the validity of the questionnaire.

Data collection:

Data were collected through a self-administered designed questionnaire that was available in the form of an online google form. Responses were divided into three sections: the first section include questions on socio-demographic characteristics, knowledge towards adverse events of iodinated contrast, and attitude toward contrast adverse events. Attitude was assessed by Fifth Likert scale

Statistical analyses:

Data were represented in terms of frequencies and valid percentages for categorical variables. Mean, standard deviations (SD), minimum and maximum values were used to describe numerical variable. One-way ANOVA test was used to compare numerical variables between the subgroups. All P values < 0.05 were considered statistically significant. IBM SPSS (Statistical Package for the Social Science; IBM Corp, Armonk, NY, USA) was used to perform all statistical calculations, version 21 for Microsoft Windows.

Ethical considerations:

Institutional research ethics board approval was acquired prior to conducting any study procedure. A statement was included at the beginning of the questionnaire clarifying that the participation in the study is totally voluntary and that collected data were anonymous and only used for the purpose of the study.

RESULTS:

A questionnaire was distributed electronically to the people in Najran, Saudi Arabia, to investigate their level of knowledge and attitude regarding safety of

iodinated contrast media. Out of 800 questionnaires distributed, only 377 (47.125%) participated in the study; of them 68.44% were women and the rest (31.56%) were men.

Socio-demographic characteristics of the participants:

Table 1 shows the socio-demographic characteristics of the participants.

Age

The study included participants from both genders where 68.4% of the respondents were women and 31.6% were men. Age ranged from 16 to 75 years with a mean± SD value of 33.5± 9.869 years. Almost one third of the participants (33.2%) were aged from 20 to less than 30 years old and 31.6% were aged 30 to less than 40 years.

Marital status

Less than two thirds (63.7%) of the participants were married and 31.6% were single. Only 4 persons (1.1%) were widowed.

Occupation

It was observed that over half (53.6%) of the participants were employed, about one fifth (19.1%) were students, and about one quarter (24.1%) were unemployed. The rest (3.1) were retired.

Monthly income

The monthly income was ranging from less than 5000 to 50000 SR. It is revealed that most of the participants had low income with 27.3% of them had monthly income less than 5000 SR and 28.4% had a monthly income between 1000 SR and 15000 SR. Low income was observed more among women than men (29.1% and 30.2% compared to 23.5% and 24.3%). More women than men had income from 10000 less than 15000 SR (19.8 % compared to 0.8%). Monthly income from 15000 to 50000 SR was more among men than women. The differences are statistically significant (P = 0.023)

Table 1: Socio-demographic characteristics of the respondents

	Men (n=119)	Women (n=258)	Total (n=377)	P value
Age (years)				
Mean± SD	35.8± 10.416	32.4± 9.430	33.5± 9.869	<0.001
<20	1 (0.4)	1 (0.4)	17 (4.5)	
20 -	41 (34.5)	15 (5.8)	125 (33.1)	
30 -	47 (39.5)	107 (41.5)	119 (31.5)	
40 -	18 (15.1)	87 (33.7)	93 (24.6)	
50 -	11 (9.2)	46 (17.8)	20 (5.3)	
60 -	1 (0.8)	2 (0.8)	3 (0.7)	
Marital Status				
Divorced	4 (3.4)	9 (3.5)	13 (3.4)	0.538
Married	82 (68.9)	158 (61.2)	240 (63.6)	
Single	32 (26.9)	88 (34.1)	120 (31.8)	
widowed	1 (0.8)	3 (1.2)	4 (1.1)	
Occupation				
Retired	9 (7.6)	3 (1.2)	12 (3.1)	<0.001
Employed	79 (66.4)	123 (47.7)	202 (53.5)	
Student	19 (16)	53 (20.5)	72 (19.1)	
Unemployed	12 (10.1)	79 (30.6)	91 (24.1)	
Monthly income (SAR)				
Mean± SD	16513.9± 24309.689	10913.4± 17421.995	12977.8± 20374.9	0.023
<5000	28 (23.5)	75 (29.1)	103 (27.3)	
5000-	29 (24.3)	78 (30.2)	107 (28.3)	
10000 -	1 (0.8)	51 (19.8)	52 (13.7)	
15000-	25 (21)	6 (2.3)	31 (8.2)	
20000-	10 (8.4)	6 (2.3)	16 (4.2)	
30000-	2 (1.6)	0	2 (0.5)	
40000- 50000	2 (1.6)	0	2 (0.5)	

Knowledge towards adverse events of iodinated contrasts

Table 2 and figure 1 shows knowledge of respondents towards adverse events of iodinated contrasts.

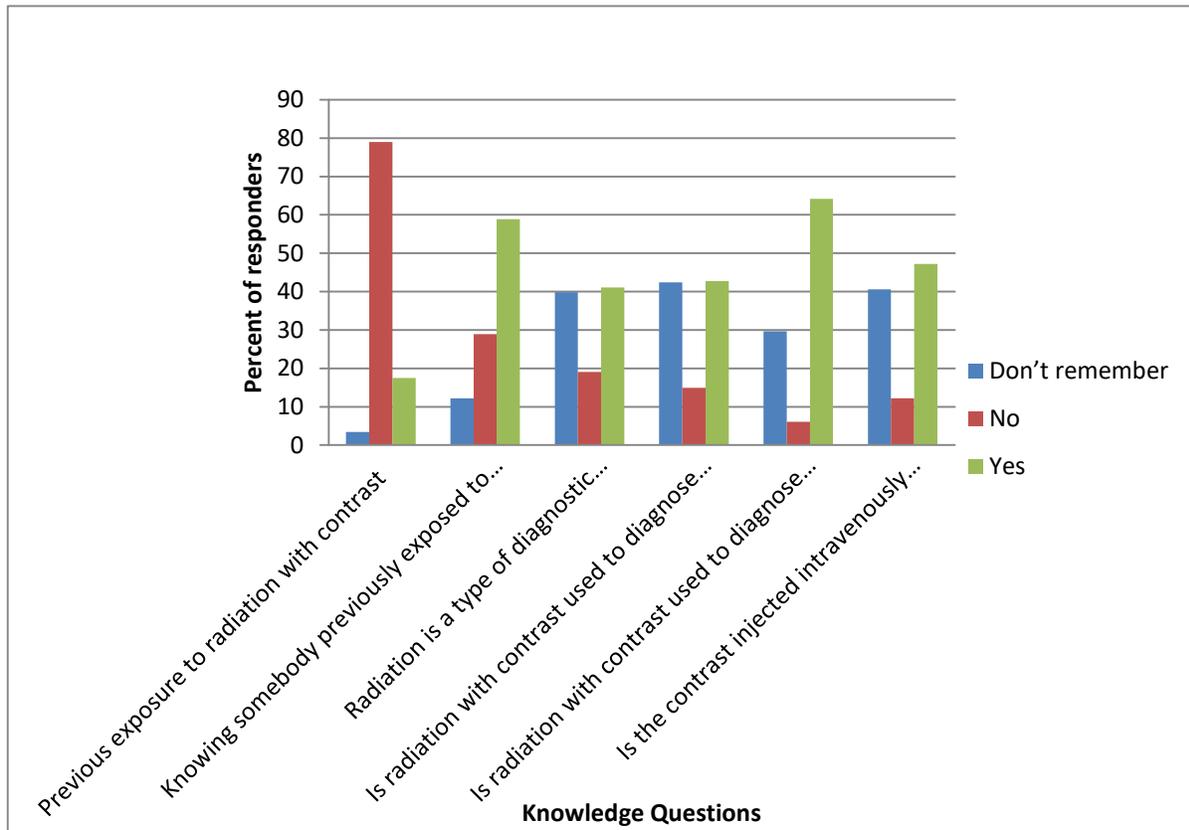
It is observed that 75.9 % of women knew that radiation with contrast used to diagnose gynecological disorders compared to 38.6% of men. Those who did not know were 10.9 % of men compared to 3.8% of women. On the other hand, 50.4% compared to 29.7% of women did not remember. The differences are statistically highly significant where $P < 0.001$. Significantly (0.004%)

more men 59.6% than women 41.4% knew that contrast is injected intravenously before the investigation. Those who did not know or did not remember were more among women than men (13.1% and 45.3% compared to 10.1% and 30.2% respectively). No significant differences were observed regarding the other items of knowledge.

Table 2: Knowledge of adverse effects of iodinated contrast media

Knowledge	Gender	Don't remember	No	Yes	Mean \pm SD	P value
Previous exposure to radiation with contrast	Men	6 (5.1)	92 (77.3)	21 (17.6)	0.18 \pm 0.382	0.509
	Women	7 (2.7)	206 (79.8)	45 (17.4)	0.17 \pm 0.384	
	Total	13 (3.4)	298 (79.1)	66 (17.5)	0.18 \pm 0.385	
Knowing somebody previously exposed to radiation	Men	15 (12.6)	28 (23.5)	76 (63.8)	0.64 \pm 0.482	0.287
	Women	31 (12.1)	81 (31.3)	146 (56.6)	0.4 \pm 0.497	
	Total	46 (12.2)	109 (28.9)	202 (53.5)	0.59 \pm 0.498	
Radiation is a type of diagnostic investigation with no therapeutic benefit	Men	40 (33.6)	27 (22.6)	52 (43.6)	0.44 \pm 0.492	0.210
	Women	110 (42.6)	45 (17.4)	103 (39.9)	0.4 \pm 0.413	
	Total	150 (39.7)	72 (19.1)	155 (41.1)	0.41 \pm 0.494	
Is radiation with contrast used to diagnose cardiac and vascular disease	Men	51 (42.8)	11 (9.2)	57 (47.8)	0.48 \pm 0.522	0.091
	Women	109 (42.2)	45 (17.4)	104 (40.3)	0.4 \pm 0.493	
	Total	160 (42.4)	56 (14.8)	161 (42.7)	0.43 \pm 0.492	
Is radiation with contrast used to diagnose gynecological disorders	Men	60 (50.4)	13 (10.9)	46 (38.6)	0.39 \pm 0.485	<0.001
	Women	52 (20.1)	10 (3.8)	196 (75.9)	0.42 \pm 0.765	
	Total	112 (29.7)	23 (6.1)	242 (64.1)	0.64 \pm 0.484	
Is the contrast injected intravenously before the investigation	Men	36 (30.2)	12 (10.1)	71 (59.6)	0.6 \pm 0.497	0.004
	Women	117 (45.3)	34 (13.1)	107 (41.4)	0.41 \pm 0.493	
	Total	153 (40.5)	46 (12.2)	178 (47.2)	0.47 \pm 0.532	

Figure1: Knowledge of adverse effects of iodinated contrast media



Attitude towards adverse events of iodinated contrasts

The attitude of both men and women and their total was neutral (weighted man ranges from 2.70 to 2.74) for that the radiation with contrast is completely safe and have no side effects. They agree that adverse effects can occur in some individuals but it is not dangerous their weighed mean varies from 3.44 - 3.54. Yet, they had neutral attitude towards the fact the incidence of side effects is very low not exceeding 1% the weighted mean ranges from 3.10 to 3.11. The same was observed regarding the fact that it is not preferred to do the test in renal patients especially advanced stages (weighted mean is 3.10 for women and 3.11 for men. However the attitude of the total group was shifted from neutral to agree (weighted mean is 3.64).

Respondents whether by gender or total agree that healthcare professional should be informed with an accurate medical history before the investigation where their weighted is 3.66 for men, 3.64for women and 4.45 for total respondents. They had neutral attitude towards side effects are instant after injecting

the contrast (weighted mean is 3.07 for men, 3.14 for women and, 3.11 for total respondents). Both groups disagree about the idea that side effects can be easily and quickly treated (weighted men is 2.44 and 2.23) however, the total response was neutral (3.12). Neutral attitude was observed towards that the investigation can be done in type 2 Diabetes (weighted mean is 3.31, 3.32, and 3.04 for both genders and total respectively). Also, their attitude was neutral regarding skin rash is the most common side effect (weighted mean ranges from 3.24 to 3.32 for both genders and total. The same was observed regarding radiation with contrast can lead to cardiac problems in rare cases (weighted mean ranges from 2.61to 3.29). The attitude was neutral regarding if he will be investigated if his doctor requested that from him (weighted mean ranges from 2.63 to 3, 09), if he will accept doing the investigation for a family member if requested by doctor (weighted mean from 2.63 to 3.14), and if it is necessary to raise the awareness of society about radiation in terms of purpose, benefits and side effects (weighted mean between 3.15 and 3.24) tables 3 and 4.

Table 3: Attitude of participants toward adverse effects of iodinated contrast

Attitude	Gender	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Weighted Mean Score
Radiation with contrast is completely safe and have no side effects	Men	3 (2.5)	17 (14.2)	54 (45.3)	35 (29.9)	10 (8.4)	2.73
	women	11 (4.2)	32 (12.1)	109 (42.2)	91 (35.2)	15 (5.8)	2.74
	Total	14 (3.7)	49 (12.9)	163(43.2)	126 (33.4)	25 (6.6)	2.70
Adverse effects can occur in some individuals but it is not dangerous	Men	8 (6.7)	54 (45.3)	44 (36.9)	8 (6.7)	5 (4.2)	3.44
	Women	23 (8.9)	122 (47.2)	88 (34.1)	22 (8.5)	3 (1.2)	3.21
	Total	31 (8.2)	176 (46.6)	132 (35)	30 (7.9)	8 (2.1)	3.51
Incidence of side effects is very low not exceeding 1%	Men	6 (5.0)	34 (28.5)	55 (46.2)	15 (12.6)	9 (7.5)	3.11
	Women	23 (8.9)	59 (22.8)	105 (40.6)	63 (24.4)	8 (3.1)	3.10
	Total	29 (7.6)	93 (24.6)	160 (42.4)	78 (20.6)	17 (4.5)	3.10
It is not preferred to do the test in renal patients especially advanced stages	Men	31 (26.1)	26 (21.8)	55 (46.21)	4 (3.3)	3 (2.5)	3.11
	women	63 (24.4)	76 (29.4)	89 (34.4)	22 (8.5)	8 (3.1)	3.10
	Total	94 (24.9)	102 (27.1)	144 (38.1)	26 (6.8)	11 (2.9)	3.64
Healthcare professional should be informed with an accurate medical history before the investigation	Men	66 (55.4)	31 (26.1)	21 (17.6)	0	31 (26.1)	3.66
	Women	161 (62.4)	67 (25.9)	26 (10.1)	4 (1.5)	67 (25.9)	3.64
	Total	227 (60.2)	98 (25.9)	47 (12.4)	4 (1.1)	1 (0.2)	4.45
Side effects are instant after injecting the contrast	Men	5 (4.2)	36 (30.2)	53 (44.5)	19 (15.9)	6 (5.1)	3.07
	Women	21 (8.1)	64 (24.8)	98 (37.9)	69 (26.7)	6 (2.3)	3.14
	Total	26 (6.8)	100 (26.5)	151 (40.1)	88 (23.3)	12 (3.1)	3.11
Side effects can be easily and quickly treated	Men	5 (4.2)	24 (20.1)	67 (56.3)	20 (16.8)	3 (2.5)	2.44
	Women	15 (5.8)	73 (28.2)	110 (42.6)	54 (20.9)	6 (2.3)	2.23
	Total	20 (5.3)	97 (25.7)	177 (46.9)	74 (19.6)	9 (2.3)	3.12
The investigation can be done during pregnancy when necessary	Men	3 (2.5)	13 (10.9)	42 (35.2)	36 (30.2)	25 (21.1)	3.17
	Women	4 (1.5)	19 (7.3)	74 (28.6)	97 (37.5)	64 (24.8)	2.98
	Total	7 (1.8)	32 (8.4)	116 (30.7)	133 (35.2)	89 (23.6)	2.3
The investigation can be done in type 2 Diabetes	Men	3 (2.5)	35 (29.4)	65 (54.6)	11 (9.2)	5 (4.2)	3.31

	Women	12 (4.6)	49 (18.9)	135 (52.3)	47 (18.2)	15 (5.8)	3.32
	Total	15 (4)	84 (22.3)	200 (53.1)	58 (15.4)	20 (5.3)	3.04
Skin rash is the most common side effect	Men	9 (7.5)	7 (5.8)	68 (57.1)	7 (5.8)	3 (2.5)	3.24
	Women	26 (10.1)	28 (10.8)	127 (49.2)	28 (10.8)	6 (2.3)	3.32
	Total	35 (9.3)	103 (27.3)	195 (51.7)	35 (9.3)	9 (2.4)	3.32
Radiation with contrast can lead to cardiac problems in rare cases	Men	6 (5)	33 (27.7)	68 (57.1)	8 (6.7)	4 (3.3)	2.97
	Women	19 (7.3)	93 (36.1)	108 (41.8)	27 (10.4)	11 (4.2)	2.61
	Total	25 (6.6)	126 (33.4)	176 (46.7)	35 (9.3)	15 (4)	3.29
Will you be investigated if your doctor requested that from you	Male	2 (1.6)	64 (53.7)	30 (25.2)	8 (6.7)	15 (12.6)	3.09
	Female	5 (1.9)	121 (46.8)	84 (32.5)	21 (8.1)	27 (10.4)	2.63
	Total	7 (1.9)	185 (49.1)	114 (30.2)	29 (7.7)	42 (11.1)	3.12
You will accept doing the investigation for a family member if requested by doctor	Male	3 (2.5)	67 (56.3)	25 (21.1)	10 (8.4)	14 (11.7)	3.09
	Female	2 (0.7)	128 (49.6)	84 (32.5)	20 (7.7)	24 (9.3)	2.63
	Total	5 (1.3)	195 (51.7)	109 (28.9)	30 (8)	38 (10.1)	3.14
It is necessary to raise the awareness of society about radiation in terms of purpose, benefits and side effects	Male	2 (1.6)	28 (23.5)	12 (10.1)	2 (1.6)	75 (63.1)	3.20
	Female	1(0.3)	64 (24.8)	29 (11.2)	3 (1.1)	161 (62.4)	3.15
	Total	3 (0.8)	92 (24.4)	41 (10.9)	5 (1.3)	236 (62.6)	3.24

Table 4: Weighing the attitude score of participants

Weight (Likert scale)	Weighted mean	Attitude
1	From 1.00 to 1.79	Strongly disagree
2	From 1.80 to 2.59	Disagree
3	From 2.60 to 3.39	Neutral
4	From 3.40 to 4.19	Agree
5	From 4.25 to 5.00	Strongly agree

Source: Abd-Elfattah (2008)

Factors influencing knowledge and attitude towards adverse effects of iodinated contrast.

Correct answer takes one point while wrong answer takes zero point. Total score of the knowledge section was out of six, with a mean (\pm SD) score of 3.85 ± 1.44 points. The total score was out of sixty and weighed mean score for attitude section was 47.57 ± 4.8 points.

Table 5 shows factors influencing knowledge and attitude towards adverse effects of iodinated contrast. The influence of knowledge and attitude were evaluated and tested using one way ANOVA test, at a level of significance p value <0.05 .

The analysis included gender, monthly income, age groups, previous exposure to radiation and

occupation as proposed factors that may have an influence on the responses.

Regarding knowledge about safety of iodinated contrast, it was observed that women had significantly better knowledge compared to men ($p=0.046$). Also, middle aged adults had significantly higher scores in knowledge ($p<0.001$). However, the knowledge of participants who were not previously exposed to contrast is significantly much better than other respondents ($P<0.001$). Finally, employed respondents showed significantly better knowledge where $p<0.001$.

Attitude towards adverse events of iodinated contrast showed that the monthly income had a significant influence on attitude, where higher income was associated with significantly higher attitude score ($p=0.034$). Additionally, occupation also was found to affect the attitude. Employed respondents showed significantly higher attitude scores compared to students and unemployed participants ($p=0.001$). Furthermore, respondents with previous exposure to iodinated contrast had higher attitude score than those who don't remember previous exposure or those who were not previously exposed to iodinated contrast ($p<0.001$).

Table 5: factors influencing knowledge and attitude towards adverse events of iodinated contrasts

		Knowledge total score		Attitude total score	
		Mean± SD	P value	Mean± SD	P value
Gender	Female	3.95 ± 1.331	0.046*	47.52±4.531	0.810
	Male	3.63 ± 1.642		47.66±5.353	
Monthly Income (SR)	<5000	3.66±1.341	0.344	46.76±5.611	0.034*
	5000 -	3.94±1.432		48.32±4.322	
	10000 -	3.73±1.383		47.63±3.492	
	15000 -	4.25±1.435		49.83±4.980	
	20000 -	3.56±1.788		47.06±3.298	
	30000 -	5±1.158		53.50±2.125	
	40000 50000	3±1.416		46.50±2.123	
	Age (years)	<20		2.93±1.288	
20 -	4.19±1.414	47.75±5.243			
30 -	3.92±1.342	47.72±4.418			
40 -	3.56±1.333	47.93±4.415			
50 -	1.63±1.028	47.45±4.452			
60 -	2.66±0.577	43.33±2.881			
Previous exposure to radiation	Don't remember	1.92±1.381	<0.001*	43.38±3.041	<0.001*
	No	4.13±1.362		47.33±4.893	
	Yes	2.95±2.955		49.46±3.857	
Occupation	Employed	4.00±1.383	<0.001*	48.44±4.388	0.001*
	Student	3.95±1.564		46.87±4.945	
	Un employed	3.69±1.362		46.48±5.152	
	Retired	1.91±0.990		45.33±5.411	

*Level of significance at p value <0.05

DISCUSSION:

Iodinated contrast agents played a very important role in the advancement of radiological investigations over the past decade. However, some adverse effects can occur due to their use, although the occurrence of these events is very rare.

In the present study, the level of knowledge and attitude of the Saudi population towards adverse events of iodinated contrast in different radiological investigations revealed that weighed mean score for attitude was 47.57 out of 60 points, while average score for knowledge was 3.85 out of 6 points.

It was also shown that females and middle aged adults showed better knowledge compared to their male peers from other age groups. Additionally, previous exposure to contrast showed a positive effect on attitude, while the opposite occurred with knowledge scores. Finally, employment and high monthly income were associated with better knowledge and attitude towards adverse events of iodinated contrast.

The present work evaluated the knowledge and attitude of the general population regardless to their relation to medical practice. Other studies were more

concerned with medical practitioners either radiologists or non-radiologists. Redan *et al* [14] were more focusing on the knowledge and attitude of radiologists towards adverse events of contrasts particularly contrast induced nephropathy during computed tomography.

Redan *et al.* surveyed 509 radiologists in ten European countries either online or over the phone. Redan *et al.* included only experienced radiologists who performed more than fifty computed tomography per week [14]. The study showed that level of awareness was variable between radiologists and recommended increasing efforts for better education of radiologists to minimize the risk of contrast induced nephropathy.

The present study focused on general population rather than medical professional. Knowledge and attitude were evaluated on different adverse events of iodinated contrast in different investigation not only computed tomography. Also, the present work investigated the factors affecting the knowledge and attitude. However, our findings are compliant with Redan *et al.*[14] in that the general population as well has a poor level of knowledge and awareness regarding adverse events of iodinated contrast agents especially in low socio economic communities.

Other study was also concerned with non-radiologists knowledge on these adverse events. Mutala *et al.*[15] investigated the knowledge of non-radiologist clinicians on the safety of iodinated contrasts. Mutala *et al.*[15] included 197 Kenyan clinician in a survey with different levels of experience and medical training. Unlike Redan *et al* [14]., Mutala *et al.* [15] evaluated the factors affecting the level of knowledge [14,15]. The study concluded that level of experience and training were the most important factors affecting clinician knowledge, and that the overall knowledge of the clinicians needs to be improved [15].

In the present study, factors influencing level of knowledge and attitude were also evaluated in the general population in a different community (Najran, Saudi Arabia). It was revealed that attitude was mainly influenced by monthly income, previous exposure to iodinated contrast and occupational status, while knowledge was mainly affected by gender, age, occupational status and previous exposure to iodinated contrast. Additionally, larger sample size was included in the present work which increases the reliability of our results.

Trindade *et al.*[16] found that non radiologist clinician had a reasonable level of knowledge towards adverse reactions of iodinated contrast. They surveyed 203 non radiologist clinicians in Brazil with

different levels of experience and recommended increasing the collaboration between radiologists and non-radiologists to minimize the risk of adverse events of iodinated contrasts [16]. The two studies comply with our findings on recommending more efforts to increase the awareness towards adverse events of iodinated contrasts either in medical or non-medical communities [15, 16].

Finally, to our knowledge, this is the first Saudi trial to evaluate the level of knowledge and attitude of Saudi population regarding the safety and use of iodinated contrasts, especially in Najran. This can open the gates for decision makers to develop health education program to increase the awareness of the population towards this important issue minimize the fear from adverse effect of iodine contrast. Moreover, training is needed for radiologists to deal with the adverse effect of iodinated contrast and further research is needed to develop new safer contrasts.

CONCLUSION:

The level of knowledge and attitude of the Saudi population towards the adverse events of iodinated contrast is relatively low. National awareness programs should be encouraged to increase their level of knowledge regarding the risk of these events. Further studies are required in other regions in Saudi Arabia in order to have complete figures for the whole Saudi population.

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