AWARENESS OF COSMIC RADIATION AND ITS HAZARDS AMONG AIR TRAVELERS IN MAIDUGURI METROPOLIS

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Abstract
Background: Cosmic rays are high-energy subatomic particles arriving at Earth from space. Most of them, about 85%, are protons or hydrogen nuclei, 12% are helium nuclei or alpha particles, and 1% belongs to heavier nuclei, all the way up to uranium. The rest (2%) are electrons. Air travelers are exposed to Cosmic rays depending on the altitude

Objective: To determine the awareness of air travelers on cosmic radiation and to ascertain their knowledge about the health hazards of cosmic radiation.

Method: Using a descriptive survey design, a 22-item self-structured questionnaire was used for data collection among air travelers in the Maiduguri International Airport, Borno state. It was validated by the supervisor and reliability test using Cronbach's alpha (0.68). Pilot study was also done to validate the questionnaire
A Convenient sampling technique was employed for the study. Participants comprised of 131 males (71.1%) and 53 females (28.8%).

Result: The study revealed that 61% of the participants knew about cosmic radiation. Also, 55% of the respondents knew about the health hazards of Cosmic Radiation. The researcher also authenticated his hypothesis on whether the knowledge on the health hazard affected their rate of flying using Pearson Chi square test in which the knowledge on the health hazard of cosmic radiation did not affect their rate of flying.

Conclusion: These study have shown that there is adequate awareness of cosmic radiation and its health hazards among air travelers, though slightly above average in Maiduguri metropolis. Also knowledge on the health hazards of cosmic radiation did not affect the rate of flying of air travelers.

Key Words: Cosmic Radiation, Air travelers, Altitude, Awareness

Introduction

Civil airline passengers and crewmembers are exposed to elevated levels of galactic radiation due to the altitude aircraft operates. One (1) Cosmic radiation is a form of ionizing radiation that originates from the outer space and it consists of primary particles like (protons, electrons, alpha particles and other heavy ions) and secondary particles (neutrons) [1].
Primary cosmic radiation interacts with molecules of the atmosphere and generates secondary and tertiary radiation at aircraft altitudes. These include neutrons, which the

International Agency for Research on Cancer (IARC) has determined to be a Group I (known human) carcinogen as well as charged particles with high relative biological effectiveness. 9 recommends effective dose (ED) limits of 20 mSv year−1 averaged over 5 years (100 mSv in 5 year) for radiation workers and 1 mSv yr^{-1} for the public [2].

The ICRP considers flight crew to be occupationally exposed to cosmic radiation. European Union member states implemented regulations for flight crew requiring assessment of exposure when exposure is likely to be >1 mSv yr^{-1} and adjustment of work schedules so that no individual exceeds 6 $mSvyr^{-1}$ [9].

People are exposed to low doses of radiation almost every day of their lives from the use of x-ray based equipment for the early diagnosis of disease 5, to radiation workers who make use of radiation equipment's in industries, mobile phone users, to patients in the radiology department and frequent fliers who receive higher doses of radiation than infrequent fliers. Background radiation, or radiation levels in the environment, consists of cosmic radiation and radiation emitted from radioactive substances present in the ground and commercial sources, 11 Thus, all living organisms are constantly receiving background radiation. Cosmic radiation contributes to about 13 percent of natural background radiation level which is about 1mSv per year. 18 In contrast to radiation workers in nuclear industry or patients receiving diagnostic procedures who primarily receive x-rays or gamma-rays, the air crews, pilots, and frequent flyers receive radiation doses in which about 50 percent is from neutron radiation. Research has shown that neutron radiation is more damaging than x-rays or gamma-rays.

Methodology

A descriptive survey design was used, the research was carried out in Maiduguri international airport Borno state which is one of the busiest airport in the Northeast. A 22-item self-structured questionnaire was used for data collection among airtravelers.Data was analyzed using statistical package for social sciences (SPSS) Descriptive and inferential statistics were stated and tabulated chi-square test was used to test for the hypothesis that was made. Ethical clearance was obtained from the Federal Airport Authority of Nigeria and NAMA and consent was also sorted from participants.

Results

Table 1 Socio-Demographics Characteristic

Demographic		Frequency	Percentage
Age	*18-29*	38	20.9%
	30-39	67	37.0%
	40-49	39	21.5%
	50 above	37	20.44%
	TOTAL	181	100%
	Male	131	71.1%
Gender	*Female*	53	28.8%
	TOTAL	**184**	**100%**
Highest academic qualification	SSCE	12	6.5%
	Diploma	13	7.1%
	Higher national diploma	67	36.4%
	Degree	65	35.3%
	Masters	13	7.1%
	Ph.D.	8	4.3%
	Others	4	2.2%
	TOTAL	182	100%
0ccupation	Civil servant	79	42.9%
	Business	39	21.2%
	Others	55	30.4%
Total		**184(100%)**	**100%**

Table 2: Awareness of Cosmic Radiation

s	Very often	Often	Not often	Total
How often do you fly	56(30.3%)	86(46.7%)	41(22.3`%)	183(100.0%)
	Response			
	Agreed	Disagreed	I don't know	Total
Cosmic Radiation is found in the atmosphere	145(78.8%)	9(4.9%)	30(16.3%)	184(100.0%)
Cosmic radiation increases with increasing altitude	112(60.9%)	15(8.2%)	57(31.0%)	184(100.0%)
Cosmic radiation is a form of ionizing radiation	99(53.8%)	11(6.0%)	64(34.8%)	174(94.6%)
The more time spent at high altitude the higher the exposure to cosmic radiation	114(62.0%)	21(11.4%)	47(25.5%)	182(98.9%)
Only atomic weapons and atomic reactors emits ionizing radiation	42(22.8%)	78(42.4%)	60(32.6%)	180(97.8%)
I heard about cosmic radiation from books	104(56.5%)	49(26.6%)	28(15.2%)	181(98.4%)
I heard about cosmic radiation from other sources	120(65.2%)	36(19.6%)	22(12.0%)	178(96.7%)

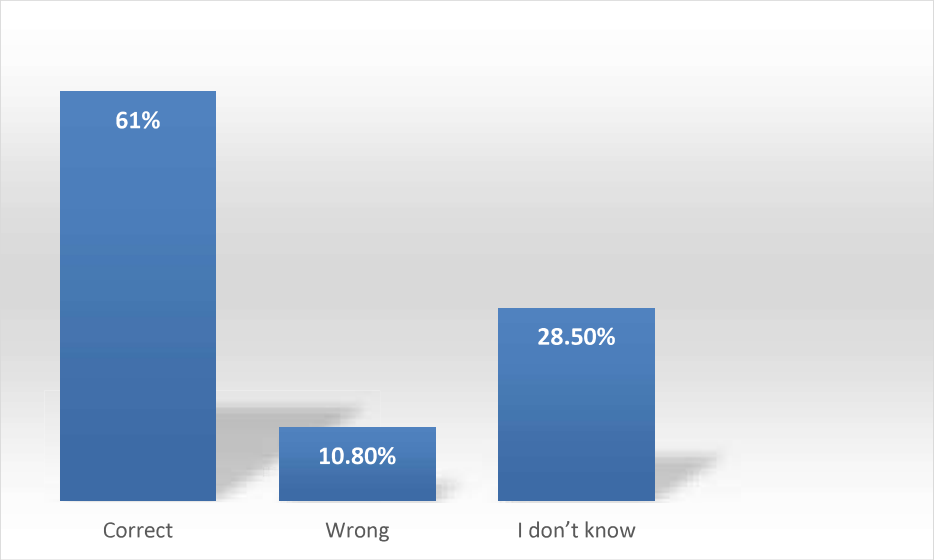

Figure 1 Summary on Awareness of Cosmic Radiation

Table 3: SECTION C HEALTH HAZARDS OF COSMIC RADIATION

Question	Agreed	Disagree	I don't know	Total
All radiation can cause cancer	82(44.6%)	62(33.7%)	38(20.7%)	182(98.9%)
Our bodies absorb cosmic radiation in the environment	120(65.2%)	27(14.7%)	35(19.0%)	182(98.9%)
The radiation received during a single chest x-ray is almost equivalent to the radiation received during transatlantic flight:	75(40.8%)	35(19.0%)	73(39.7%)	183(99.5%)
Radiation may cause damage to DNA	112(60.9%)	25(13.6%)	46(25.0%)	183(99.5%)
Radiation may induce birth defect on fetus in pregnant women	145(78.8%)	13(7.1%)	26(14.1%)	184(100.0%)
When individual is exposed to ionizing radiation, some symptoms don't show till after 10 to 15 years of exposure	105(57.1%)	14(7.6%)	64(34.8%)	183(99.5%)
I am not aware of any safety measure against radiation	80(43.5%)	86(46.7%0	18(9.8%)	184(100.0%)

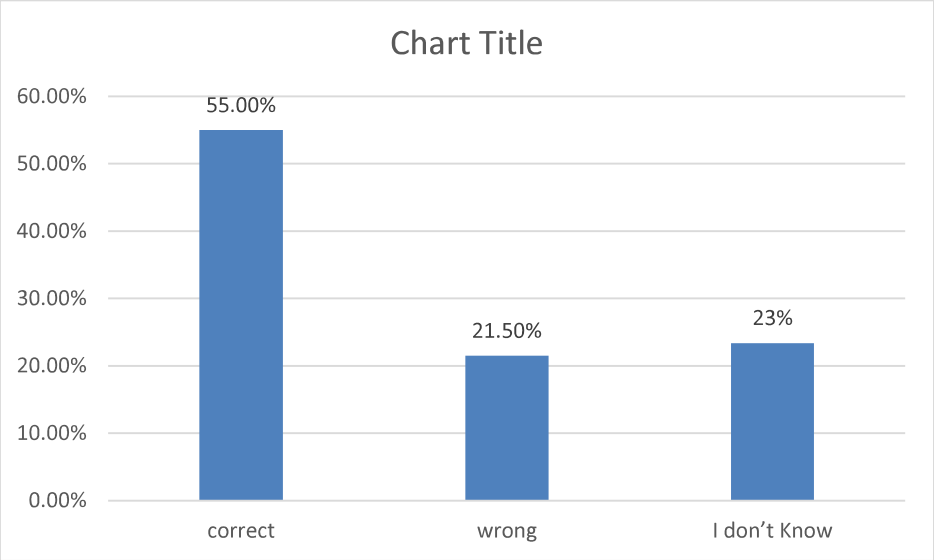

Figure 2 Summary on Knowledge of the health hazards of cosmic radiation

Table 4: Research Question associated with rate of flying.	**Pearson chi-square test**	**Asymp. Sig.(2-sided)**
All radiation can cause cancer	6.236	0.182
Our bodies absorb cosmic radiation in the environment	8.806	0.066
The radiation received during a single chest x-ray is almost equivalent to the radiation received during transatlantic flight.	1.132	0.889
Radiation may cause damage to DNA	5.183	0.298
Radiation may induce birth defect on fetus in pregnant women	1.579	0.813
When individual is exposed to ionizing radiation, some symptoms don't show till after 10 to 15 years of exposure	3.405	0.493
I am not aware of any safety measure against radiation	3.362	0.449

Discussion

Findings from the research show that majority of the respondents were males (71.1%) while (28.8%) were females. This could be attributed to the fact that that males travel more than their female counterparts and males were more disposed than their female counterparts to fill the questionnaire. This corresponds with the findings of 3 on Cancer Incidence among Finnish Flight Attendants in which majority of the respondents were males. Also, a greater percentage of the respondents fall under the 30-39 age groups, this age range can be regarded as the active age range. The least represented age range was above 50.

The research also revealed that most of the respondents (85.3%) attended or were attending tertiary institutions. This goes to show that Nigerians are now taking education very seriously and that a vast majority of the country's population are degree holders improving the literacy level lending credence to the Federal government's efforts to improve the country's literacy level to meet with one of the Millennium Development Goals (MDG) by the year 2020. It was also found that civil servants formed a majority of

the respondents' population (73.3%), this can be due to the fact that their line of work entails much travelling especially by air due to the fact that Non-governmental organization created vast employment opportunity to the state and mostly it entails traveling to remote areas to deliver humanitarian services. Findings from this research reveals that majority of the respondents (61%) know what cosmic radiation is while (28.5%) have misconception about cosmic radiation, out of which (10.8%) respondents did not really know what cosmic radiation is. This may be attributed to the fact that some of the respondents (62.3%) read about cosmic radiation from books and also heard it from other sources. while (23.7%) neither heard it from books nor other sources.

This research also reveals that air travellers from Maiduguri metropolis are aware of cosmic radiation in their environment and also in the atmosphere this might also be attributed to the fact that majority of the respondents are educated which gave them the opportunity to know about cosmic radiation.

This research revealed that 55% of the respondents knew that exposure to cosmic radiation at high altitude constitutes health hazards while 21.5% have misconception about this fact 23% have no idea about it. This is in contrary to a research by 16, in which the sampled population were totally unaware of ionizing radiation and its health detriments within their environment.This may also be attributed to the fact that most of respondents are educated and most of the respondents read about the phenomenon of cosmic radiation in books and some heard it from other sources like media also it might be attributed to the climatic condition in Maiduguri and high temperature which might led to individual becoming more curious to know about this fact.

The researcher sought to authenticate his alternate hypothesis but his findings were in the contrary. It revealed that knowledge of the health implications of cosmic radiation did not significantly affect the rate of flying. Most of the respondents flew often (46.7%) only when necessary which can mean anything from once every three months. The researchers authenticate his Null hypothesis and his findings were in line with his Null hypothesis. It revealed that knowledge of the health hazards of cosmic radiation did not significantly affect the rate of flying. This might be attributed to the fact that most of the air traveller's users are aware of the phenomenon of cosmic radiation.

Conclusion

Findings from this study have shown that there is adequate knowledge and awareness of cosmic radiation and its health hazards among air travelers, in Maiduguri metropolis. Also knowledge on the health hazards of cosmic radiation did not affect the rate of flying of air travelers.

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