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### ANALYSIS OF THE RELATIONSHIP BETWEEN HEALTH PROBLEMS AND DEMOGRAPHIC CHARACTERISTICS OF THE RADIOGRAPHERS

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## ABSTRACT

The objectives of this survey, quantitative, and empirical-based descriptive research study, undertaken in Tirunelveli city of Tamil Nadu, India, are: To identify the perception of the radiographers towards various health-related problems, and to find the relationship between the demographic variables of the respondents and their health problems. To achieve these objectives, the study has sampled 200 respondents (100 respondents from both multi-speciality hospitals and 100 from diagnostic centres) using both judgement and convenience sampling techniques. Primary data have been collected using a questionnaire method with the assistance of an interview method. The secondary data were collected from books, journals, websites, and conference proceedings. Percentage, Weighted average, and Kruskal Wallis tests have been administered to analyze the data. The results show: tiredness and low energy; body pain; and difficulties in sleeping are the topmost health problems. Depression, anger, emotional disturbance; digestive disorders, and skin and eye problems are the next foremost health problems. Urinary tract infection; Diabetes mellitus and Hypertension, and irregular menstrual, weight loss, and hair loss are the least problems. The hypotheses testing proves: the demographic variables—age, salary, place of stay, educational qualification, work experience, and work shift have a significant relationship with the health problems, whereas the variables—marital status, native place, and job situation have no significant relationship with the health problems of the radiographers.

**Keywords:** Health problem, Radiographer, Private hospital, Diagnostic centre, Demographic characteristics, Tirunelveli city.

## INTRODUCTION

### Study background and need for the study

Sound health is critically inevitable for healthcare workers because they spend a significant amount of time in the workplace in a day with patients of various diseases – non-infectious and infectious that varies from mild to severe. Sound health of employees not only decides their performance and productivity, but also determines employee turnover and organization reputation. The work environment of healthcare workers - prolonged standing, handling minute and sharp types of equipment and materials; huge workload; navigating various natures of patients and their relatives; handling unexpected emergencies and crises—are largely associated with various health problems: sleeplessness, headache, too much tiredness, ulcer, body pain, diabetes mellitus, hypertension, eye problems, hair fall, and infections

(Halpenny D et al., 2012; Yang L.Q et al., 2014). However, ensuring and maintaining sound health are the responsibilities of both organizations and employees exist in ensuring and maintaining sound health (Decker F and Decker A, 2015; Ulich E and Wulser M, 2018): organizations should provide well-nurtured and comfortable work environment, at the same time, employees should have awareness of health and try to maintain it by following the protocols and diets.

The study area, Tirunelveli city—the capital of Tirunelveli District of Tamil Nadu, India—has accomplished profound growth in the recent past few years on business side: the numbers of hospitals, diagnostic centres, pharmacies, small clinics, educational institutions, and other small and medium scale businesses have faced abundant growth. Despite the rich growth, the human resource management practice remains underdeveloped: two shift work system with twelve hours-duty; low salary; unfairness in salary fixing, increment, incentives, promotion, and transfer; massive discrimination in recruitment which is done based on caste, religion, and language; substandard welfare facilities; unprofessional and unqualified managers, and their unethical, autocratic and substandard leadership approaches towards employees are prevalent, and remain the precipitating factors affecting both physical and mental health of all category of employees including radiographers.

However, radiographers are the more vulnerable group exposed to health related problems. Their environment of work is one of the reasons: they expose to massive radiation as part of their daily work, which, by nature, causes numerous health related issues. The health problems of radiographers not only infringe on their work and safety, but also erode the result of their work causing mal-diagnosis and risk to the safety of patients, which eventually collapse the treatment (because the right treatment depends on right diagnosis) and inflame the reputation of the organization. At the same time, although all radiographers expose to radiation and other work-related issues - such as heavy workload, long working hours, unfair shift schedules, and so on - the severity of health problems vary person to person: Demographic factors play critically crucial role in deciding them. Thus, the health problems of radiographers concern many stakeholders – medical doctors, patients, organization - so it is necessary to study their various health issues, and also to analyse how demographic characteristics have association with their health issues.

## **Research objective**

The objectives of this research are as follows:

- i. To identify the perception of the radiographers towards various health-related problems.
- ii. To find the relationship between the demographic variables of the respondents and their health problems

## **Research Hypotheses**

To analyze the relationship between demographic variables and health problems of radiographers, the following hypotheses have been framed.

H<sub>01</sub>: There is no significant difference in the perception scores of health problems among the respondents based on age.

H<sub>02</sub>: There is no significant difference in the perception scores of health problems among the respondents based on marital status.

H<sub>03</sub>: There is no significant difference in the perception scores of health problems among the respondents based on native places.

H<sub>04</sub>: There is no significant difference in the perception scores of health problems among the respondents based on places of stay.

H<sub>05</sub>: There is no significant difference in the perception scores of health problems among the respondents based on educational qualifications.

H<sub>06</sub>: There is no significant difference in the perception scores of health problems among the respondents based on salary.

H<sub>07</sub>: There is no significant difference in the perception scores of health problems among the respondents based on work experience.

H<sub>08</sub>: There is no significant difference in the perception scores of health problems among the respondents based on work shifts.

H<sub>09</sub>: There is no significant difference in the perception scores of health problems among the respondents based on job situation.

### **Scope of the research**

This study has focused on the radiographers working at both private multi-speciality hospitals and private diagnostic centres in Tirunelveli city - the capital of Tirunelveli District of Tamil Nadu, India - located in the southern part of Tamil Nadu. The radiographers qualified with a Bachelor's Degree in Radiography (B.Sc. – Radiography) and a Diploma (DMRT) of one and two-year courses have been focused on in this study.

### **Significance of the study**

The result of this research will give private multi-speciality hospitals and diagnostic centres a deep insight into health problems and enable them to analyze the various causes behind these health problems and discover the ways to solve those problems and their root causes. This research will assist the managers of the radiography department to relook into their leadership qualities and correct their mistakes. The results and other factors discussed in this study will educate the radiographers on how to safeguard themselves from the health hazards causing health-related issues, to take preventive or precautionary steps. The concept of this study will serve as a rich source of secondary data for future research scholars.

### **REVIEW OF LITERATURE**

According to the World Health Organization, 1948, “Health is a state of complete physical, mental and social well-being and not merely an absence of disease or infirmity” (Park K 2000). Disease is a physiological or psychological dysfunction. Mental health is “a state of balance between the individual and the surrounding world, a state of harmony between oneself and others, a coexistence between the realities of the self and that of other people and that of the environment” (Park K 2000).

Rokhokim (2010) found the major occupational or health-related diseases or injuries were injuries due to an accident, musculoskeletal disorders in the back, limbs, or other body parts, cardiovascular disease, respiratory disease, mental disorder, neurological or sensory disorder, digestive tract disease, and skin disorders.

Laura Alferts (2010) observed that dehydration, headache, waist pain, back pain, neck pain, disorganized mind, diarrhoea, vomiting, high blood pressure, malaria, fever and dizziness, vaginal infection, skin and nail infection on hands, sore ribs and chest, neck and upper back pain, arm pain, blurred vision, breathing problem, and knee pain were the major problems of informal workers in market and street traders in Accra.

Rajan D (2012) ascertained that tiredness, backache, headache, difficulty getting up in the morning, poor sleeping, digestive problems, poor attitude, depression, and feelings of inadequacy were the foremost impacts of stress among radiographers.

Garima Gupta and Tarique (2013) found that low back pain, knee pain, shoulder pain, and back pain were the major problems and they persisted for more than a year. And, poor posture and lack of ergonomic awareness were the principal causative factors contributing to the development of musculoskeletal disorders.

Rajan D (2014) explained that tiredness, backache, headache, difficulty getting up in the morning, poor sleeping, digestive problems, poor attitude, depression, and feelings of inadequacy were the impacts of stress perceived equally by radiographers of both kinds of hospitals.

Rajan D (2016) discovered that weight loss, sleep disorder, pain, fatigue, gastrointestinal disorders, irregular sleep and sleeplessness, high stress, and carcinoma due to prolonged exposure to radiation were the foremost factors being perceived as impacts of occupational by the radiographers.

Hulls PM, et al., (2018) reported that work-related skin diseases were higher in radiographers compared with other occupations. The incidence of work-related respiratory disease, in contrast, was higher in other occupations compared with radiographers.

Rajan D (2018) found that organization structure, policy, radiographer's specific, and fear and safety-related factors were the foremost dimensions; resources, workload, work shift, environment, and hygiene were the next foremost; and interruption, patient and communication, and training-related factors were the least dimensions of causes of occupational hazards.

Rajan D (2019) ascertained that there was no marked difference in the perception level of the radiographers working in both hospitals and diagnostic centres towards various impacts of occupational hazards. The perception level of radiographers working in both kinds of organizations was moderate towards the impacts of occupational hazards.

Jagodic M et al., (2020) discovered that most stress is caused by conflict with the supervisor, poor team communication, and conflict with colleagues. Less stressful situations were: work conditions, shift work, work with interns and students, students' mentoring, monotonous work, and fear of work results.

Chinene B et al., (2023) discovered: frustration, stress, exhaustion/burnout, being overwhelmed, hope, unappreciated, gratitude, anxiety, sadness, fear, disconnected, pride, feeling intimidated, anger, powerless, loneliness, and grief were the mental issues affecting radiographers.

Rajan D and Piyanka Dhar (2023) proved that tiredness and low energy; body pain; difficulties in sleeping; depression, anger, and emotional disturbances; and digestive disorders were the foremost health-related problems of radiographers. Skin and eye problems; urinary tract infections; diabetes mellitus and hypertension; and irregular menstrual, weight loss and hair loss were the next foremost health-related problems of radiographers.

Rajan D (2023) demonstrated that tiredness and low energy; body pain; difficulties in sleeping; depression, anger, and emotional disturbances; and digestive disorders were highly perceived by radiographers working in private multi-speciality hospitals rather than diagnostic centres. However, skin and eye problems; urinary tract infection; diabetes mellitus and hypertension; and irregular menstrual, weight loss, and hair loss have been equally perceived.

From the literature reviewed, it could be known that various studies have been undertaken about radiographers and their health issues, and there is a specific study in the study area, done by the same author, that described the health problems of the radiographers working in multi-speciality hospitals. Similarly, the researcher conducted the pilot study with sixty respondents from both multi-speciality hospitals and diagnostic centres to learn about the health problems of radiographers working in those two kinds of organizations. However, there is a need for a large study to know about the relationship between the health problems and demographic characteristics of radiographers. Therefore, this present research is attempted adding large respondents in the study area.

## **RESEARCH METHODOLOGY**

This survey, quantitative and empirical-based research work is descriptive. A total of 200 respondents - 100 respondents from both multi-speciality hospitals and diagnostic centres respectively – were sampled using both purposive and convenience sampling techniques. The primary data were collected using the structured self-made questionnaire, which was made based on Likert's five-point scale. It contained five subscales: Strongly Agree, Agree, Undecided, Disagree, and Strongly Disagree. They were allocated with the values as follows: Strongly Agree—5; Agree—4; Undecided—3; Disagree—2; Strongly Disagree—1. Besides, the questionnaire consisted of two sections: Section A—indicates the demographic details of the respondents, and Section B—describes the health problems of the radiographers. The interview method was also applied to collect additional information about both the sources and intensity of health problems. The secondary data were collected from books, journals, websites, and conference proceedings. The data were analyzed using: Percentage method—to analyze the demographic details of the respondents; Weighted average

method—to rank the perception of the respondents towards health problems; Kruskal Wallis – to discover the relationship between health problems and demographic characteristics.

## ANALYSIS AND INTERPRETATION

**Table 1: Demographic Characteristics**

Measure	Item	Frequency	Percentage
Sex	Male	160	80
	Female	40	20
Marital status	Married	145	72.5
	Unmarried	55	27.5
Age	Below 25 years	45	22.5
	Between 25 and 30 years	25	12.5
	Between 30 and 35 years	62	31
	Above 35 years	68	34
Native place	Rural	155	77.5
	Urban	45	22.5
Residential status	Owned house	65	32.5
	Rented house	135	67.5
Places of stay	Home	145	72.5
	Hostel	55	27.5
Educational Qualification	B.Sc Radiography	8	4
	DMRT (Two years)	72	36
	DMRT (One year)	120	60
Salary (Rs)	Below 10000	66	33
	Between 10000 and 15000	64	32
	Between 15000 and 20000	45	22.5
	Above 20000	25	12.5
Year of working experience	Below 2 year	66	33
	Between 2 and 4 years	64	32
	Between 4 and 6 years	45	22.5
	Above 6 years	25	12.5
Job situation	Full-time	180	90
	Part-time	20	10
Work shift	Rotating eight-hour shift	8	4
	Rotating twelve-hour shift	172	86
	Permanent day shift	13	6.5
	Permanent night shift	7	3.5

Source: Primary data (based on author's self-made questionnaire)

It can be seen from Table 1 that the majority of the respondents are male (80%), married (72.5%), and full-time employees (90%). Among them, the majority of the respondents are above the age of 35 (34%), belong to rural areas (77.5%) and live in rented houses (67.5%). Besides, among the respondents, the majority of them live in rented houses (67.5) and stay at home (72.5%). Of all, the majority of the respondents are qualified with a DMRT (one year) course (60%), and receive a salary of below 10,000 Rupees (33%). Moreover, the majority of the respondents have below 2 years of working experience (33%), and do rotating twelve-hour shifts work (86%).

**Table 2: Health Problems of Radiographers**

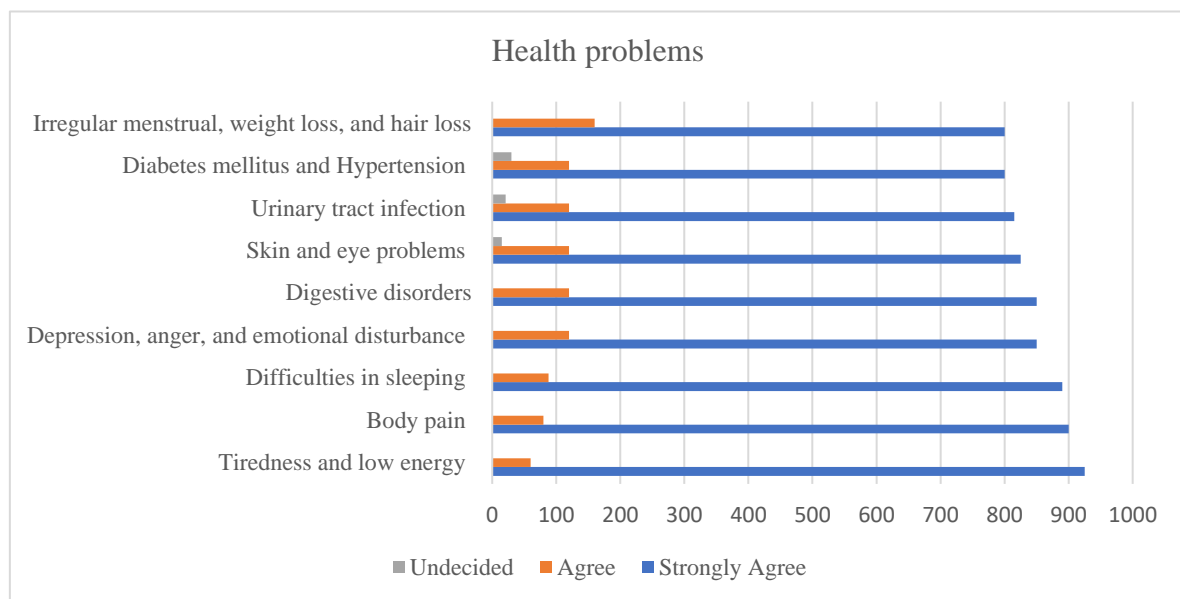
Health problems	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree

Tiredness and low energy	925	60	0	0	0
Body pain	900	80	0	0	0
Difficulties in sleeping	890	88	0	0	0
Depression, anger, and emotional disturbance	850	120	0	0	0
Digestive disorders	850	120	0	0	0
Skin and eye problems	825	120	15	0	0
Urinary tract infection	815	120	21	0	0
Diabetes mellitus and Hypertension	800	120	30	0	0
Irregular menstrual, weight loss, and hair loss	800	160	0	0	0

Source: Primary data (based on author's self-made questionnaire)

Table 2 shows that the majority of the respondents have strongly agreed that 'tiredness and low energy, body pain, and sleeping difficulties' are their top health problems. Emotional disturbances, weight loss, hair loss, diabetes mellitus, and hypertension are the next foremost health problems according to the perception score of the respondents. Digestion-related diseases, skin and eye problems, and urinary tract infections are the next foremost health-related issues among the radiographers.

Figure 1: Health problems among radiographers



## Relationships between demographic variables and health problems

Table 3: Relationship of age, and salary with health problems

Health problems	Age			Salary		
	Critical Value	Level of significance	Result	Critical Value	Level of significance	Result
Tiredness and low energy	10.052	0.013	Sig	10.417	0.015	Sig
Body pain	17.999	0.000	Sig	33.953	0.000	Sig
Difficulties in sleeping	17.042	0.001	Sig	13.110	0.004	Sig
Depression, anger, and emotional disturbance	27.161	0.000	Sig	22.812	0.000	Sig
Digestive disorders	38.985	0.000	Sig	13.614	0.003	Sig
Skin and eye problems	16.352	0.001	Sig	25.795	0.000	Sig



Urinary tract infection	13.207	0.004	Sig	4.373	0.224	Not sig
Diabetes mellitus and Hypertension	16.810	0.001	Sig	13.881	0.003	Sig
Irregular menstrual, weight loss, and hair loss	16.438	0.001	Sig	20.400	0.000	Sig
Total score	26.406	0.000	Sig	24.827	0.000	Sig

Degree of freedom: 3, at 5 percent level; Source: Computed from primary data

Table 4 indicates: the value of the level of significance of the total scores (0.000) is less than 0.05 (5% level) for both age and salary, and hence the null hypothesis is rejected stating that there is a significant difference in the perception scores of health problems among the group of respondents based on age and salary.

**Table 4: Relationship of marital status, and native place with of health problems**

Health problems	Marital status			Native place		
	Critical Value	Level of significance	Result	Critical Value	Level of significance	Result
Tiredness and low energy	1.075	0.300	Not sig	4.637	0.031	Sig
Body pain	0.545	0.460	Not sig	10.854	0.001	Sig
Difficulties in sleeping	0.581	0.446	Not sig	0.231	0.631	Not sig
Depression, anger, and emotional disturbance	2.169	0.141	Not sig	0.180	0.671	Not sig
Digestive disorders	2.023	0.155	Not sig	4.578	0.032	Sig
Skin and eye problems	3.880	0.049	Sig	0.892	0.345	Not sig
Urinary tract infection	1.224	0.269	Not sig	0.997	0.318	Not sig
Diabetes mellitus and Hypertension	12.415	0.000	Sig	25.969	0.000	Sig
Irregular menstrual, weight loss, and hair loss	0.118	0.731	Not sig	0.751	0.386	Not sig
Total score	0.239	0.625	Not sig	0.195	0.659	Not sig

Degree of freedom: 1, at 5 per cent level; Source: Computed from primary data

Table 4 shows: the value of the level of significance of total scores is more than 0.05 (5 percent level) and hence the null hypothesis is accepted stating that there is no significant difference in the perception scores of health problems among the group of respondents based on marital status, and native place.

**Table 5: Relationship of educational qualification, and work experience with health problems**

Health problems	Educational qualification			Work experience		
	Critical Value	Level of significance	Result	Critical Value	Level of significance	Result
Tiredness and low energy	2.805	0.094	Not sig	15.160	0.002	Sig
Body pain	12.958	0.000	Sig	2.784	0.426	Not sig
Difficulties in sleeping	0.012	0.914	Not sig	12.472	0.006	Sig
Depression, anger, and emotional disturbance	23.055	0.000	Sig	39.103	0.000	Sig
Digestive disorders	10.507	0.001	Sig	29.202	0.000	Sig
Skin and eye problems	24.253	0.000	Sig	4.085	0.252	Not sig
Urinary tract infection	18.581	0.000	Sig	12.088	0.007	Sig
Diabetes mellitus and Hypertension	18.479	0.000	Sig	6.544	0.088	Not sig
Irregular menstrual, weight loss, and hair loss	3.061	0.080	Not sig	3.675	0.299	Not sig
Total score	7.377	0.007	Sig	9.830	0.020	Sig

Degree of freedom: 3, at 5 per cent level; Source: Computed from primary data

Table 5 confirm the value of the level of significance of the total score is less than 0.05 (5 per cent level), hence the null hypothesis is rejected stating that there is a significant difference in the perception scores of health problems among the group of respondents based on educational qualification, and work experience.

**Table 6: Relationship of work shift, and places of stay with of health problems**

Health problems	Work shift			Places of stay		
	Critical Value	Level of significance	Result	Critical Value	Level of significance	Result
Tiredness and low energy	20.145	0.000	Sig	15.783	0.000	Sig
Body pain	13.263	0.001	Sig	15.107	0.000	Sig
Difficulties in sleeping	39.938	0.000	Sig	6.047	0.014	Sig
Depression, anger, and emotional disturbance	13.104	0.001	Sig	9.391	0.002	Sig
Digestive disorders	28.908	0.000	Sig	27.439	0.000	Sig
Skin and eye problems	3.147	0.207	Not sig	15.556	0.000	Sig
Urinary tract infection	0.768	0.681	Not sig	0.009	0.926	Not sig
Diabetes mellitus and Hypertension	15.768	0.000	Sig	12.791	0.000	Sig
Irregular menstrual, weight loss, and hair loss	41.841	0.000	Sig	49.855	0.000	Sig
Total score	13.976	0.001	Sig	24.678	0.000	Sig

Degree of freedom (work shift): 3, at 5 per cent level; Degree of freedom (places of stay): 1, at 5 per cent level; Source: Computed from primary data

Table 6 illustrate that the value of the level of significance of the total scores of both work shift and places of stay is less than 0.05 (5 per cent level). Hence, the null hypothesis is rejected stating that there is a significant difference in the perception scores of causes of health problems among the group of respondents based on work shift, and places of stay.

**Table 7: Relationship of job situation with health problems**

Health problems	Critical value	Level of significance	Result
Tiredness and low energy	26.318	0.000	Sig
Body pain	1.119	0.571	Not sig
Difficulties in sleeping	13.098	0.001	Sig
Depression, anger, and emotional disturbance	1.120	0.571	Not sig
Digestive disorders	40.408	0.000	Sig
Skin and eye problems	11.707	0.003	Sig
Urinary tract infection	31.746	0.000	Sig
Diabetes mellitus and Hypertension	20.959	0.000	Sig
Irregular menstrual, weight loss, and hair loss	2.695	0.260	Not sig
Total score	1.342	0.511	Not sig

Degree of freedom: 2, at 5 percent level; Source: Computed from primary data

Table 7 demonstrates that, the value of the level of significance of the total score is more than 0.05 (5 per cent level). Hence, the null hypothesis is accepted stating that there is no significant difference in the perception scores of health problems among the group of respondents based on job situation.

## Discussion of Findings

This present study has found that difficulty in sleeping; depression; body pain; and digestive disorders are the health problems of radiographers. These findings are supported by Holt

(1993) who observed that stress can lead to a variety of physical complaints, including sleep and gastrointestinal problems and Jackson SE and RS Schuler (1985), Shah MZ (1990); Critchley et al (2004); and Mansor et al (2003); Maslach (1986); Jinky Leilanie Lu (2008)' and Antoniou et al (2003) who noted that physiological stress is correlated with headache, migraine, abdominal pain, lethargy, backache, chest pain, fatigue, heart palpitation, sleep disturbance and muscle ache, changes in eating, drinking, sleeping and smoking habits, leg cramps, frustration. This present research has also shown that hypertension, weight lose, depression, emotional disturbances, and digestive disorders are the problems of radiographers. These go with studies of Guthrie (2006); Kyriacou (2001); Kyriacou and Sutcliffe (1977); Rajan and Vijayalakshmi (2016); Gidman WK *et al.* (2007) Bond C *et al.* (2008), Eden M *et al.* (2009) Gidman W (2011) who indicated that shift work and huge workload have also been strongly associated with temporary and chronic illnesses, such as headache, hypertension, reduced immune response, stomach complaints, ulcers, depression and stroke.

## RECOMMENDATION AND CONCLUSION

### Recommendations

Based on the analysis of the data, the following recommendations are suggested to both eliminate the health hazards of the radiographers and annihilate their health problems.

1. Twelve hours duty should be reduced into eight hours and a two-shift work system can be converted into a three-shift work system. The managers should schedule the work shifts without discrimination in terms of caste, religion, or any other factor. Similarly, the workload of the radiographers should be neutralised by appointing sufficient number of radiographers. Adequate break and additional salary should be given to compensate the heavy workload and shortage of employees.
2. Necessary protective devices should be provided to the radiographers to handle the rays safely, and enough holidays, as per the rules, and monetary allowances should be offered to them to recover their health from the rays they have already been exposed to and motivate them.
3. Managers of the radiography department should be trained to exercise a healthy leadership approach: they should understand the workload and health problems of the radiographers empathetically and accordingly deal with them.
4. Ergonomics training - to push mobile X-rays, climb the stairs, and bend the body; education - to handle the chemicals carefully without harming the eyes and skin; and health education about balanced diet and timely food, and emotional training – to manage their emotions intelligently and handle the emotionally imbalanced patients tactically, and also how to plan the work to manage the huge workload and complete the tasks smartly without spending too much energy should be given.
5. Health education should also focus on the importance of sound sleeping, physical exercise, rest, and stress management. Besides, the management should strengthen the welfare facilities and provide the following facilities richly: separate restrooms for

female employees, frequent free medical check-ups, concession food in the hospital canteen, immunization, and an infection-free work environment.

### Limitations and Future Research Directions

1. The study is limited to Tirunelveli city only, and has administered non-probability sampling techniques: convenience and judgement. Hence, the future studies can be done with entire District, and probability sampling techniques.
2. The study has chosen only private multi-specialty hospitals and private diagnostic centres. The future studies can cover both the government hospitals and private single-specialty hospitals.
3. The study has discussed only the health issues of the radiographers. The future studies can cover risk factors and performance.

### Conclusion

Since the study has discovered ‘tiredness and low energy, body pain, and sleeping difficulties’ are the top; emotional disturbances, weight loss, hair loss, diabetes mellitus, and hypertension are the next foremost; and digestion-related diseases, skin and eye problems, and urinary tract infections are the least health-related issues among the radiographers, it is necessary to take critical steps to maintain their sound health. Reducing the working hours; educating the radiographers, leadership training to the managers; strengthening welfare facilities; enhancing safety measures; equalizing the workload; avoiding discrimination; career development; dealing with them professionally are some of the instruments to maintain their health—both physically and mentally—strong.

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