Iraqi Journal of Medical and Health Sciences, ISSN: 3078-8722, Vol. 1, No. 3 2026, Pages 27-35
DOI: https://doi.org/10.51173/ijmhs.v3i1.24

Iraqi Journal of Medical and Health Sciences
Journal Homepage
https://ijmhs.mtu.edu.iq/ijmhs/index.php/home

RESEARCH ARTICLE – MEDICINE (MISCELLANEOUS)

Assessment of Brain Tumour Risk Factors Among Patient Attending Baghdad Hospital

Zainab Mohamed Mahmmod[1], Fatima Mallalah Mohammed[2], Rafah Oday Hessian[1], Ali Najm Abdullah[1], Mustafa Hazem Majed[1], Mudhar A Al-Obaidi[3*], Nordeen Shoqirat[4, 5]

[1] Technical Institute of Baquba, Middle Technical University, Baghdad, Iraq

[2] College of Medicine, University of Diyala, Diyala, Iraq

[3] Technical Instructor Training Institute, Middle Technical University, Baghdad, Iraq

[4] Faculty of Health Sciences, Higher Colleges of Technology (RAK), United Arab Emirates

[5] Faculty of Nursing, Mutah University, Jordan

[*] Corresponding author: dr.mudhar.alaubedy@mtu.edu.iq

Article Info.

Article history:

Received
3 Jan. 2025

Revised
1 Fab. 2025

Accepted
9 Apr. 2025

Publishing
10 May. 2026

Abstract

Background: Certain brain tumor forms can be misdiagnosed, which can impair a patient's capacity to respond to treatment and lower their chance of survival.

Objective of study: Due to an increase in the number of brain tumor cases worldwide, it is important to identify the risk factors of patient with brain tumors.

Materials and Methods: This study intends to evaluate the brain tumor risk factor at the Baghdad hospital and determine the relationship between the risk factor and demographics. A cross-sectional, descriptive design study was carried out from October 29, 2021, to May 22, 2022. Recruitment was done for a purposeful (non-probability) sample of 41 patients. The research team provided the questioner for the participants to collect the data manually. IBM-Statistical Package for Social Science (SPSS) version 26.0 is used to analyses the data using descriptive and inferential statistical techniques.

Results: The results demonstrate that elderly individuals are more vulnerable than younger ones. Men and women are equally likely to be affected by brain tumors. Also, a person's chance of developing a brain tumor is more likely to be influenced by their family history. People with different educational backgrounds are all at the same risk of developing brain tumors. Furthermore, BMI has little bearing on the development risk of brain tumors. Finally, the likelihood of brain tumors is strongly influenced by an individual's line of work.

Conclusion: The findings revealed that age plays an essential part in assessing the risk of developing brain tumors, with older people having a higher risk than younger people. Gender does not appear to be a significant factor in predicting the chance of getting brain tumors. This indicates that brain tumors are equally likely to affect men and women.

Publisher: Middle Technical University

Keywords: Risk Factor; Brain Tumors; Baghdad Hospital; Demographic; Patient.

1. Introduction

Brain tumors (BT) are so common that general practitioners need to be proficient in both diagnosing and treating them. The most common kinds of brain tumors include meningiomas, glioblastomas, and intracranial metastases from systemic cancers [1- 4]. The central nervous system may develop metastases anywhere along the neuro-axis, necessitating advanced multidisciplinary care from medical oncologists, radiation oncologists, and neurosurgeries [5]. Primary care physicians have challenges because of the complexity of caring for patients with brain tumors, despite their critical role in the early detection and coordination of therapy for these patients. Furthermore, the incidence of brain tumors is increasing in some populations, most likely due to advancements in the diagnosis, treatment, and prognosis of primary brain tumors [6]. About 50% of individuals with high-grade gliomas, the most fatal and serious brain tumor, pass away within 1-2 years [7]. Glioma patients require a precise prognosis in order to plan their therapy. Conventional survival prediction techniques frequently depend on clinical information and a limited set of manually generated magnetic resonance imaging (MRI) parameters. Specifically, this can be challenging, subjective, and time-consuming [8]. Certain brain tumor forms can be misdiagnosed, which can impair a patient's capacity to respond to treatment and lower their chance of survival [9]. One conventional method of distinguishing between different types of brain cancer is to look at the patient's brain MRI images. This method is laborious and prone to human mistake when dealing with enormous volumes of data and many types of brain tumors [10]. The brain tumor microenvironment (TME) is emerging as a key regulator of cancer development in primary and metastatic brain malignancies. Because of this organ's unique properties, developing TME-targeted therapeutics necessitates a specific framework [11].

The prevalence of gender disparities in human development, aging, and disease can frequently be taken for granted. However, there is little question that the persistent differences between men and women have a major role in terms of disease prognoses and risk, and cancer is no different [12]. Men and women differ quantifiably in terms of cancer progression, death, and prevalence [13]. It is necessary to trace the origins of these disparities at the molecular, cellular, tissue, organismal, and evolutionary levels in order to provide a comprehensive explanation that uses data from many domains in a way that is both mutually constraining and informative [14]. Brain tumors continue to be nearly always fatal, with a median lifespan of 12–14 months, even with the best of treatments. The current standard of care is radiation and chemotherapy after the greatest possible safe resection [15]. The introduction of temozolomide, a kind of chemotherapy, into routine care has yielded little benefit. Chemotherapy and radiation therapy can cause increased uptake of contrast agents in some individuals [16, 17], which can lead to an expansion of the remaining tumor or the emergence of new lesions that resemble the growth of the tumor. The condition known as "pseudo-progression" has emerged as a significant difficulty in the follow-up of brain tumors because there is no convincing evidence other than surgery or serial imaging, which puts patients with actual progressive disease (PD) at risk of treatment delays and creates uncertainty for both patients and treating clinicians [18, 19].

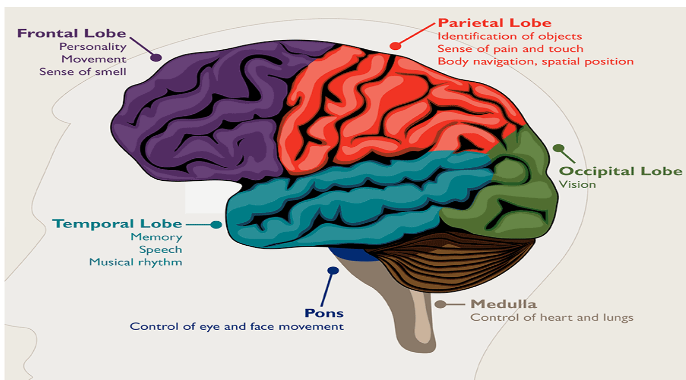

Fig. 1. Shown brain tumor symptoms

Nearly all brain cancers are now treated with proton radiation treatment [20- 23]; yet, little is known about radiation necrosis in these individuals. In neurosurgery, neuronavigation—which uses preoperative imaging data—is a widely used method for image guidance [24]. But when brain shift invalidates the patient-to-image registration, it becomes untrustworthy. To enable prolonged use of neuronavigation devices throughout the duration of surgery, numerous researchers have attempted to explain, quantify, and make up for this phenomena [25, 26]. The present investigation attempts to appraise the incidence, timing, clinical significance, risk factors, and imaging shapes of radiation necrosis in pediatric patients with brain tumors preserved with proton radiation therapy. Given the growing incidence of brain cancers worldwide, it is vital to achieve research in a Baghdad hospital to estimate brain tumor risk factors. Thus, the present study plans to evaluate the brain tumor risk factor at the hospital in Baghdad and determine how risk factors and demographics are connected. Research of this kind could recognize risk factors unique to a given place, providing vision into the sophisticated interactions between genetic, environmental, and demographic factors that principal to brain tumor growing in Baghdad's population. Understanding these risk factors is imperious in order to perform focused preventive efforts, allow early detection tactics, and adapt healthcare therapies to the particular requirements of the populace. The research offers significant findings that can inform healthcare policies, strengthen patient outcomes, and add to the body of knowledge on brain tumor epidemiology worldwide. It also advances the scientific comprehension of brain tumor etiology by clarifying the interaction between risk factors and demographics.

2. Materials and Methods

The procedures used to conduct the current study includes the following aspects: design of the study, administrative approval procedures, ethical consideration, setting of the study, samples, inclusion and exclusion criteria, instrument of the study, validity and reliability, method of data collection, data analysis, and limitations of the study. From 29 October, 2021 to 22 May, 2022, a descriptive cross-sectional design research titled "Evaluation of the Risk Factors of Patient with Brain Tumors" was conducted. To systematically achieve this research, self-administrative questionnaire was designed (Appendix A). The questionnaire consists of the covering letter and other three parts; the first part contains socio-demographic characteristics (age, gender, educational level, place of residence, occupation…etc.,). The second part contains the clinical characteristics of the participants and risk of genetic. The Third part consists of a questionnaire about the assessment of the risk factors of patient with brain Tumors. The selected samples are 41 patients (subjects), was chosen using a purposive (non-probability) sample approach.

The following are the inclusion and exclusion criteria for all patients (subjects) who visit hospitals for neurology. First, the inclusion criterion comprises: Ten patients at the Baghdad center for nuclear medicine and radiation therapy (subjects). Patients at the Dr. Saad Al Watri hospital for neurosciences (31) (subjects). Patients (subjects) who attend neurology hospitals were recruited using paper-printed questioners. Second, the exclusion criterion comprises: patients (subjects) who declined to participate in the survey. Patients (subjects) who are not affiliated with one of the hospitals listed in the section on inclusion requirements. The statistical software (IBM SPSS Statistics) version 26.0 was used to conduct the statistical analysis. Application of descriptive and inferential statistical methods was used to analyse the data. In this regard, the wavelengths (F), (%) percentages, average score (X-), standard errors (SD), indicator of pearson correlation (r) are the computations were made in this research.

2.1. Design of the study

The "assessment of the risk factors of patient with brain tumors" descriptive cross-sectional design study was initiated on October 29, 2021, and run until May 22, 2022.

2.2. Administrative approval arrangements

The Ministry of Higher Education and Scientific Research, in conjunction with the College of Nursing at the University of Baghdad, obtained official approvals that were required to enable the researchers to collect research data.

2.3. Ethical considerations

After receiving the study proposal, the University of Baghdad, College of Nursing's Institutional Review Board (IRB) accepted the research. The confidentiality of the individuals' identities was maintained in the documentation of all the information they supplied for the research endeavor. This indicates that the subject's record was uniquely identified by a number. The data is securely saved and only the lead investigator gets access to it. The confidentiality and protection of the subjects' identities during the study was maintained. A file that required a password to access contained electronic data as well. The only information shared in the study report is the aggregate form of the findings. Moreover, subjects were well-versed that they should only tell what they felt contented sharing and they preserved the right to be withdrawn at any time at their discretion.

2.4. Setting of the study

The study was carried out in Baghdad, where neurology hospitals were visited to get answers to the questionnaire from the subjects. The obtained answers were collected from Baghdad center for nuclear medicine and radiotherapy and Dr. Saad Al Watri hospital for neurosciences.

2.5. Sample of the study

The study's sample, which comprised 41 patients (subjects) who visit neurology hospitals, was chosen using a straightforward, purposive (non-probability) selection approach. Patients were recruited via paper-based questionnaires. The research team provided the participants with paper copies of the questioner, which they were to self-administer in order to collect the data manually.

2.6. Instrument of the study

The researchers reviewed the literature to create a self-administrative questionnaire for the current investigation. The covering letter and two more sections made up the questionnaire. The first section asked questions about sociodemographic characteristics like age, gender, education level, place of residence, and occupation, among other things. The second section included four questions about the subjects' second clinical features. The questions had a straightforward Yes/No response structure. The third section includes a questionnaire with seventeen questions about the evaluation of the risk factors for patients with brain tumors. The following scores were assigned to the items based on a Likert scale: No = (2), and Yes = (1).

2.7. Validity of the instrument

It was discovered that the brain tumor risk factor assessment questionnaire had good face validity [27] and could be used to investigate the degree of risk factors for brain tumors in patients. An expert panel comprising six members determined the content validity of the instrument . There were six representatives from the university of Baghdad's college of nursing. Examiners looked over the questionnaire with the intention of assessing each item's readability, relevancy, and clarity.

2.8. Limitation of the study

The current study has restricted to a small sample size of 41 patients, which could affect how broadly the results can be applied. Also, we should not ignore the fact that the sample was taken while the subjects were in the hospital, which could have affected the results because of the pressures placed on them.

3. Results

The distribution of the study samples according to general questions and variables related to sociodemographic characteristics is shown in Table 1. Table 1 shows that 61% of the study participants are greater the age of 30 years old, making up the majority of the study samples. In this regard, only 4.9% of participants are between the ages of 11 and 15 years old. Moreover, men make up 65.9% of the study samples population, the majority of whom are male. Only 9.8% of the study's samples graduates from elementary school, while the bulk, 26.8%, are from middle and intermediate schools. Just 22% of survey participants reside in rural areas, with the majority of participants (78%), living in cities. Table 1 also depicts that the majority (29.3%) of the survey sample work from home as stay-at-home moms and the remaining (26.7%) are freelancers. The majority of research participants (92.7%) do not use of personal protective equipment. Moreover, just 9.8% of the research samples report taking occasional vacations to avoid radiation exposure, compared to 90.2% who did not. Despite that 41.5% of the study subjects smoke, the majority of the sample (58.5%) do not smoke. Out of the study samples, the majority (61%) fall between the normal weight range (18.5-24.9), with only 2.4% being morbidly obese (greater than 40).

Table 2 depicts the risk of genetic. For each variable, the frequency and percentage of people in each category are displayed in Table 2. Brain tumor family history indicates that of the 41 people, 11 (26.829%) have a history of brain tumors in their family, whereas 30 (73.17%) do not.

Table 3 depicts the distribution of participants based on their exposure to different risk factors for brain tumors. According to the findings, 4 (9.75%) of the subjects had high ionizing radiation exposures, while 37 (90.25%) had not.

Table 1. Patients (subjects) socio-demographic information

Variables	Groups	Frequency	Percentag%
Age	(4 - 10)	4	9.8
	(11 - 15)	2	4.9
	(16 - 20)	3	7.3
	(21 - 29)	7	17.1
	(>30)	25	61.0
	Total	41	100.0
Gender	Male	27	65.9
	Female	14	34.1
	Total	41	100.0
Educational level	Does not read or write	6	14.6
	Reads and writes	11	26.8
	Elementary school graduate	4	9.8
	High school graduate (intermediate and middle school)	11	26.8
	College or institute graduate	9	22.0
	Total	41	100.0
Place of residence	City	32	78.0
	Country-side	9	22.0
	Total	41	100.0
Occupation	Government employee	9	22
	Freelance	11	26.8
	Not Working	9	22.0
	Home maker	12	29.3
	Total	41	100.0
Do you use personal protective equipment	Yes	3	7.3
	No	38	92.7
	Total	41	100.0
Do you enjoy periodic vacation to get rid of radiation	Yes	4	9.8
	No	37	90.2
	Total	41	100.0
Do you smoke	Yes	17	41.5
	No	24	58.5
	Total	41	100.0
Body Mass Index (BMI)	Underweight (<18.5)	7	17.1
	Normal weight (18.5-24.9)	25	61.0
	Overweight (25-29.9)	6	14.6
	Obesity (30-39.9)	2	4.9
	Morbid obesity (>40)	1	2.4
	Total	41	100.0

Table 2. Risk of genetic

Variables	Groups	Frequency	Percentage %
Family history brain tumor	Yes	11	26.829
	No	30	73.17
	Total	41	100.0
History of chickenpox	Yes	0	0
	No	41	100
	Total	41	100.0
Age 50 or 60 and above	Yes	7	17.07
	No	34	82.92
	Total	41	100.0
Illness (Tuberous Sclerosis, Neurofibromatosis, Necessary Basal Cell Carcinoma Syndrome, Li-Fraumeni Syndrome)	Yes	0	0
	No	41	100
	Total	41	100.0
Genetic polymorphisms disease	Yes	4	9.75
	No	37	90.25
	Total	41	100.0

Regarding the assessment of the patient's brain tumor risk factors, Table 3 depicts that only 2 individuals (4.9%) have a low risk of developing brain tumors. However, 28 (68.3%) of the individuals have a moderate risk of developing brain tumors compared to 11 (26.8%) of the individuals have a high risk of developing brain tumors. Statistical analysis shown The findings of a statistical analysis looking at the connection between age and brain tumor risk variables are depicted. A one-way ANOVA test was used for the study, with age serving as the independent variable and risk factors serving as the dependent variable. The findings indicate that the risk variables for brain cancers vary statistically significantly depending on the age group ($F(4, 36) = 3.617$, $p = 0.014$). This indicates that a person's age is a highly reliable indicator of their chance of getting a brain tumor. In other words, there are many risk factors for brain tumors among those people greater than 30.In addition, the table displays the 95% confidence intervals for the mean risk factor scores for each age group. These intervals demonstrate the range of values that the true mean risk factor score is expected to fall within. For the age group "above 30 years old," the 95% confidence interval is (1.72, 2.12). This indicates that we can be 95% confident that the true mean risk factor score for this age group falls between 1.72 and 2.12. No statistically substantial relationship was established between the gender variable and the test outcomes at (F =.002, df = 1, sig =.964). Given that the gender variable does not statistically significantly affect the test results, we hypothesize that this is because the majority of brain tumors are genetic and run genetically in families. The findings of a statistical analysis looking at the connection between gender and brain tumor risk variables were showed. Gender served as the independent variable while risk factors served as the dependent variable in this one-way ANOVA test study. The findings indicate that there is no statistically weighty difference between males and females in terms of the risk factors for brain cancers ($F(1, 39) = 0.002$, $p = 0.964$). This indicates that an individual's chance of acquiring brain tumors is not significantly predicted by their gender. In other words, brain tumors are hereditery and run in families regardless of gender.

Table 3. Risk factor of brain tumor

Variables	Groups	Frequency	Percentage%
High dose ionizing radiation exposure	Yes	4	9.75
	No	37	90.25
	Total	41	100.0
Alcohol	Yes	1	2.43
	No	40	97.57
	Total	41	100.0
Time using mobile phones	8-12h	5	12.91
	12-16h	29	70.73
	16-20h	7	17
	Total	41	100.0
Exposure chemical agents	Yes	13	31.7
	No	28	68.29
	Total	41	100.0
Infection (meningitis)	Yes	3	7.31
	No	38	92.68
	Total	41	100.0
Head injury (seizures –trauma)	Yes	13	31.7
	No	28	68.29
	Total	41	100.0
Electromagnetic fields	Yes	2	4.87
	No	39	95.13
	Total	41	100.0
Dietary n-nitrosoompounds	Yes	7	17.07
	No	34	82.92
	Total	41	100.0
Occupational exposure	Yes	12	29.2
	No	29	70.8
	Total	41	100.0
Exposure to nerve agents	Yes	4	9.75
	No	37	90.25
	Total	41	100.0
Over weight and obesity	Yes	4	9.75
	No	37	90.25
	Total	41	100.0
Viral infection	Yes	5	12.19
	No	36	87.8
	Total	41	100.0

The findings of a statistical analysis looking at the connection between educational attainment and brain tumor risk variables. A one-way ANOVA test was used for the analysis, with risk variables acting as the dependent variable and educational degree acting as the independent variable. The findings indicate that the risk variables for brain tumors are not statistically significantly different for people with diverse educational backgrounds ($F(4, 36) = 2.499$, $p = 0.060$). This indicates that a person's chance of acquiring brain tumors is not significantly influenced by their educational attainment. The mean risk factor scores did not significantly differ between any of the educational level groups, according to additional analysis using the Tukey HSD post-hoc test ($p > 0.05$). This demonstrates that the chance of acquiring brain tumors is not significantly influenced by one's level of education. The findings of a statistical analysis looking at the connection between occupation and brain tumor risk variables. A one-way ANOVA test was used for the analysis, with occupation serving as the independent variable and risk factors serving as the dependent variable. The findings indicate that the risk variables for brain cancers vary statistically significantly depending on the occupation ($F(3, 37) = 3.522$, $p = 0.024$). This indicates that a person's profession is a strong indicator of their chance of getting brain tumors.

The authors speculate that this finding might be the result of occupational exposure to chemicals or radiation, two risk factors for brain tumors. The mean risk factor scores for the "Government Employee" group ($M = 2.00$, $SD = 0.000$) were significantly lower than those for the "Freelance" ($M = 1.91$, $SD = 0.302$), "Not Working" ($M = 1.33$, $SD = 0.500$), and "Home Maker" ($M = 1.83$, $SD = 0.718$) groups ($p < 0.05$), according to additional analysis using the Tukey HSD post-hoc test. This implies that compared to people in other professions, government workers have a decreased chance of brain tumor development. Additionally, the 95% confidence intervals for the average risk factor scores of every occupational group . A genuine mean risk factor score is expected to fall within a range of values indicated by the confidence intervals. Based on the data, we can infer with 95% confidence that the true mean risk factor score for the "Government Employee" group falls between 2.00 and 2.00. This is represented by the 95% confidence interval (2.00, 2.00). The findings of a statistical analysis looking at the connection between body mass index (BMI) and brain tumor risk variables. BMI served as the independent variable and risk factors served as the dependent variable in this one-way ANOVA test study. The findings indicate that the risk variables for brain cancers do not change statistically significantly throughout BMI categories ($F(4, 36) = 2.146$, $p = 0.095$). This indicates that a person's risk of brain tumor development is not significantly predicted by their BMI. The mean risk factor scores did not significantly differ across any of the BMI groups, according to additional analysis using the Tukey HSD post-hoc test ($p > 0.05$). The 95% confidence intervals for the mean risk factor scores of each BMI group. The range of values that the true mean risk factor score is most likely to fall within is shown by the confidence intervals. The confidence intervals overlap for every BMI category, suggesting that the mean risk factor scores for each category do not differ significantly from one another.

4. Discussion

The results in Table 1 would elucidate a remarkable genetic component in the development of brain tumors in this population. This is reliable with the conventional role of genetic factors in brain tumorigenesis, as indicated by several studies in the open literature [28-30]. In this resrd, the significant proportion of participants with a family history of brain tumors in this study highlights the request for healthcare professionals to consider this risk factor when testing patients with supposed brain tumors. A comprehensive family history must be considered, and genetic analysis may be suitable in some cases. Furthermore, of the persons, 34 (82.92%) are not 50 or 60 years of age or more, whereas 7 (17.07%) are. Referring to the data of illness (Necessary Basal Cell Carcinoma Syndrome, Neurofibromatosis, Li-Fraumeni Syndrome, Tuberous Sclerosis), it has been ascertained that none of the 41 people have been identified as having any of these conditions. Moreover, of the people, 4 (9.75%) have genetic polymorphisms associated with brain tumors, whereas 37 (90.25%) have not. These findings propose that genetic polymorphisms can play a significat role in the development of brain tumors in a subset of individuals. More imprtantly, the current results in Baghdad are in agreement with a number of published studies that encountered with evaluating the possible role of the genetic polymorphisms in a subset of brain tumor cases [29] highlighted the necessity of unbiased genomic analyses in investigating human brain cancer. The study signifies a potentially useful genetic alteration that can be utilised to classify and develop targeted therapies for Glioblastoma multiformes. Discussion of results in Table 2 and Table 3 include Ionizing radiation is a well-known risk factor for brain tumors, and exposure can be occurred during medical treatments, occupational settings, or environmental sources [31].

Accordingly, there is a necessity to reduce exposure to ionizing radiation whenever possible. Just 1 (2.43%) of the respondents drink alcohol, compared to 40 (97.57%) who do not. Despite an ambiguous relationship between alcohol consumption and brain tumor risk, some published studies have proposed a possible association [32]. Furthermore, 24 (12.91%) of the population use their phones for 8–12 hours, 7 (17%) for 16–20 hours, and 29 (70.73%) for the majority of the time (12–16 hours). It is important to notify that the long-term health effects of mobile phone use are still being investigated. This concern was raised by some researchers [33], who ascertained a potential potential link between mobile use and brain tumors. Of those surveyed, 13 (31.7%) had been exposed to chemical agents, whereas 28 (68.29%) had not. Indeed, exposure to certain chemicals, such as pesticides can have a direct relationship on increasing the risk of brain tumors as elucidated by [34]. Additionally, Table 3 shows the consequence of other risk factors on brain tumor. Specifically, 3 (7.31%) of the subjects developed meningitis, is an inflammation of the membranes surrounding the brain and spinal cord, while 38 (92.68%) did not. In this regard, it should be noted that there is no clear relationship between the brain tumors and meningitis. However, meningitis can upsurge the risk of emerging specific types of brain tumors as identified by [35].

Seizures and head injuries can damage brain tissue and promote the risk of having brain tumors [36]. Of the subjects, 13 (31.7%) reported having experienced seizures or head injuries, while 28 (68.29%) did not. Only 2 (4.87%) of the individuals have been exposed to electromagnetic fields, compared to 39 (95.13%) who have not. Electromagnetic fields are generated by different electronic devices and power lines. Referring to the international agency for research on cancer, there is a possible link between the long-term exposure of electromagnetic fields and developing brain tumors [37]. N-nitrosomonaphthalene is a chemical compound found in specific types of foods, such as fish and smoked meats. The international agency for research on cancer ascertained a link between the exposure to n-nitrosomonaphthalene and a possible risk of brain tumors [38]. In this aspect, seven of the subjects, (17.07%) ingest foods containing n-nitrosomonaphthalene, while 34 (82.92%) do not. Of the participants, 29 (70.8%) have not encountered work-related hazards, while 12 (29.2%) have. Furthermore, [39] elaborated the risk of exposing to nerve agents, highly toxic chemicals, that can have serious neurological damage, with an increased opportunity of brain tumors. Referring to the results of this study, 4 of the individuals involved (9.75%) have been exposed to nerve agents, while 37 (90.25%) have not. Obesity has been asscociated to an increased risk of different types of cancer, including brain tumors [40]. Of the individuals, 4 (9.75%) are obese, while 37 (90.25%) are neither. Lastly, the IARC working group on the evaluation of carcinogenic risks to humans identified that several types of viral infections, such as Epstein-Barr virus and human papillomavirus, can have a link with an increased risk of brain tumors [41].

The current study showed that 36 individuals (87.8%) have not contracted a virus, whereas 5 individuals (12.19%) have. In a study conducted at the University of Calgary in Calgary, Alberta, [42] concluded that 56.4% of patients had high levels of brain tumor risk factors, compared to 37.1% of study samples with moderate levels and 6.5% with low levels. Thus, it can be stated that in the proportion of people at high risk for brain tumors is 26.8%, which is less than the 56.4% stated by [42]. However, Table 4 introduces there are more people with a moderate risk of brain tumors (68.3%) than there were in the study by [42] of 37.1%. Finally, the presented data displays a proportion of 4.9% of individuals who have a low risk of brain tumors, which is comparable to the 6.5% found by [42]. The 95% confidence intervals for the mean risk factor scores of men and women are also displayed in the table. The range of values that the true mean risk factor score is most likely to fall within is shown by the confidence intervals. The 95% confidence intervals for males and females are 1.61, 1.95 and 1.38, 2.19, respectively. Arnal et al. [43] conducted a research in Spain which yielded inconsistent results with the findings of current study. Author [43] exhibited a statistical significance of gender as the incidence of esophageal adeno carcinoma in the US is 8 times greater in men than in women. These results are in an agreement with the findings of [44, 45].

There are 95% confidence intervals for each educational level group's mean risk factor scores. The range of values that the true mean risk factor score is most likely to fall within is shown by the confidence intervals. The confidence intervals overlap for every educational level group, suggesting that there is not a significant difference in the groups' mean risk factor scores. Referring to the obtained conclusions, a number of recommendations can be made in this topic. It is highly recommended to conduct an educational program about the importance of knowing the risk factors of brain tumors for patients and their families in hospitals to promote patient's knowledge regarding the risk factors of brain tumors. Also, it is favorable to focus on the important of the risk factors of brain tumors in the curriculum of nursing subjects to raise level of awareness of nursing students. To promote the implication of the obtained results, future research to assess the degree of risk factors associated with brain tumors in patients at different hospitals in the regions of Iraq is advised. The findings of this study specify that age is a significant factor in determining the likelihood of acquiring brain tumors, with older individuals having a larger risk than younger individuals. To pinpoint the exact causes of this elevated risk among the elderly, further thorough studies are required. Furthermore, to recognize the exact risk aspects connected to certain occupations and to generate preventative actions against brain tumors in these fields, more research is obligatory.

5. Conclusion

This study appraised the brain tumor risk factor at the Baghdad hospital and allocated the relationship between the risk factor and demographics. The findings revealed that age plays an essential part in assessing the risk of developing brain tumors, with older people having a higher risk than younger people. Gender does not appear to be a significant factor in predicting the chance of getting brain tumors. This indicates that brain tumors are equally likely to affect men and women. More importantly, it has been concluded that the common of brain tumors are genetic and run in families, which the scientists guess may be the cause of this observation. This specifies that a person's family history has a larger prospect of prompting their risk of brain tumor development than their gender. The person's educational background has no superficial effect on their chance of having brain tumors. Thus, this indicated that the risk of brain tumors is the same for people with variable degrees of education. Moreover, the risk of brain tumor development is not considerably influenced by BMI. The statistical results also indicated that the person's occupation meaningfully effects their chance of having brain tumors. People who work for the government, for instance, are less probable than people in other occupations to get brain tumors. This research not only advances our awareness of the etiological mechanisms underpinning these conditions, but it also has the opportunity to help develop specific preventive strategies, accelerate early detection protocols, and direct personalized treatment approaches, all of which can improve the general care and outcomes for brain tumor patients worldwide.

Acknowledgement

The researchers are also grateful to middle technical university, technical institute of Baquba, Diyala, university of Diyala, college of medicine, Diyala, technical instructor training institute, Baghdad, Iraq and also thank full to the faculty of health sciences, higher colleges of technology (RAK), United Arab Emirates faculty of nursing, Mutah university, Jordan for cooperation and assistance in facilitating this study.

Nomenclature & Symbols			
BMI	Body Mass Index	TME	brain tumor microenvironment
Std	Standard Deviation	SPSS	Statistical Package for Social Science
dF	Degree of freedom	MRI	magnetic resonance imaging
WHO	World Health Organization	BT	Brain tumors

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