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Review Article

Knowledge, Awareness and Perception towards Thyroid Cancer in General Population: A Systematic Review

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Abstract

Background: A good perception of disease risk can help patients adopt correct preventive behaviors and good adherence to treatment. We examined knowledge, awareness, and perception towards thyroid cancer (TC) by a systematic analysis of published literature.

Methods: Four databases, including PubMed, Medline, Embase, and Web of science were searched using relevant keywords for papers prior to June 30, 2022. The levels of knowledge, awareness, and perception about TC, as well as risk factors, clinical signs, and sources of health were narratively synthesized.

Results: Ten papers were finally included in this study for analysis. Despite relative good awareness, both the general population and medical students have relatively poor levels of knowledge and perception of TC and risk factors. The results of most studies showed that less than half of the participants had good knowledge about TC and its risk factors. Most participants are increasingly turning to the Internet and social media to obtain information about TC. This study also indicated that poor levels of knowledge regarding TC were strongly related to educational attainment and type of participants.

Conclusion: The findings of this paper provide valuable information for intervention providers to prevent and control of TC and encourage them to carry out health promotion campaigns to enhance knowledge and awareness of TC.

Keywords: Thyroid cancer; Risk factor; Awareness; Risk perception; Knowledge

Introduction

Thyroid cancer, especially for differentiated thyroid cancer (DTC), is the most common malignant tumor of the endocrine system (1). In China, the incidence of DTC is approximately 9-61/100,000 (2). Moreover, TC is 2.5 times more common in women than in men (3), and the five-year survival rate is about 98.1% (4). Although TC generally has a good prognosis, the diagnosis of cancer is a major event for patients and their families with profound psychological effects. With the increased concern about overdiagnosis and overtreatment of low-risk TC, many guidelines for fine needle aspiration biopsy and treatment have changed (5-7).

A good perception of disease risk will promote behavior change and play an important role in

health promotion. However, for the general population, the gap in knowledge, awareness, and perception of TC hinders effective prevention and treatment of such diseases. References (8-10) present models that illustrate the role of knowledge on health behaviors and sustained behavior change, such as influencing patient attitudes and practices, improving adherence to treatment, and reducing complications (11). Additionally, although they differ in content and perspective, these models all emphasize the important role of beliefs, opinions, and attitudes in guiding behavior change.

The successful implementation of health education programs is closely related to the knowledge, awareness, and perception of specific diseases in the targeted population. Therefore, based on the published literature, we evaluated the level of knowledge, awareness, and perception of TC and its risk factors, clinical manifestations, and health information sources in the general population.

Methods

We conducted this review referring to the procedures recommended in PRISMA2020 statement (12).

Search strategy

We searched four databases, including PubMed, Medline, Embase, and Web of science, for all relevant articles published before June 30, 2022 using predefined search (Title/Abstract) and indexing keywords and their combinations: "knowledge", "thyroid cancer", "thyroid Neoplasm", "risk factor", "perception" and "awareness". The reference lists of full-text papers were manually searched to find more articles related to this review. Inclusion criteria of the studies were as follows: 1) written in English and published in peer-reviewed journals; 2) any type of experimental design and methodology: including qualitative or quantitative, that examines knowledge, awareness, and perception of TC and its risk factors. Articles not written in English and from journals that have not been peer-reviewed were excluded.

Data extraction

Data extraction was done by two reviewers independently from the identified studies. Disagreements were resolved by a third reviewer. The information including authors, year of publication, study design and population, research methods, findings on knowledge, awareness of and perception regarding TC and risk factors was extracted from each eligible study when available. Data on sources of information related to TC were also extracted.

Quality assessment

For qualitative studies, the tool of Critical Appraisal Skill Programme (CASP) (13) was used to evaluate the relevance of study objectives, appropriateness of experimental design, methodology, recruitment strategy, data collection and analysis, description of results, ethical considerations, and findings.

For quantitative studies, the tool of National Institute of Health (NIH) Quality Assessment (14) was used to appraise the reliability, validity, and generalizability of the study, including research questions, participants, sample size, exposure and outcome evaluation, follow-up and statistical analysis. The overall quality of the study was rated as good, fair, or poor.

Synthesis of findings

The thematic synthesis of qualitative research reflects the transparent connection between the conclusion and the text of the research (15). This makes it possible to extract the results analytically. Findings from quantitative studies were incorporated by the topic using a multisource synthesis method that enhances transparency in the synthesis of quantitative and/or contextual data and provide a platform for comparison between studies (16). It can also serve as a guide to synthesize data from primary studies, resulting in a more meaningful and broad understanding of the topic. The findings from qualitative and quantitative research are further integrated by similar topics.

Due to heterogeneity between studies, the data were not pooled and meta-analyzed.

Ethical considerations

Ethical approval was not required as this study used publicly accessible published literature.

Results

Search results and study characteristics

A total of 1159 titles were screened first, of which 1039 titles and 15 titles were excluded due to irrelevance and duplication, respectively. Ninety-five articles were excluded because they did not contain knowledge or awareness of TC or report an individual risk factor, and 10 articles were reviewed in full after reviewing the title/abstract. The assessment and inclusion criteria are reported in Fig 1. The characteristics of the included studies were shown in Table 1.

Knowledge and awareness regarding TC

Different criteria were used across studies to measure and categorize the: levels of knowledge and awareness of TC. In a study (17), the knowledge level was defined as "low" with correct answers ranging from 0-50%, while 51-75% were "moderate" and more than 75 % were "high". Similarly, in another study (24), "good", "average" and "poor" were set to >80%, 60-79%, and <60%, respectively. In a study (18), they only classified the knowledge levels as "poor" or "good" without a predefined criterion for classifying levels of knowledge.

Some studies have shown high levels of awareness among participants about TC; 89.8% and 85.1% among women in Shah Alam and Klang has good awareness of TC (18). Although most participants were familiar with TC relevant terminology, the overall level of knowledge was low, with many studies reporting that less than 50% of participants had a good level of knowledge (17). The findings regarding the level of knowledge and awareness of TC were summarized in supplementary Table 1 (Not published. Readers may contact the authors if needed).

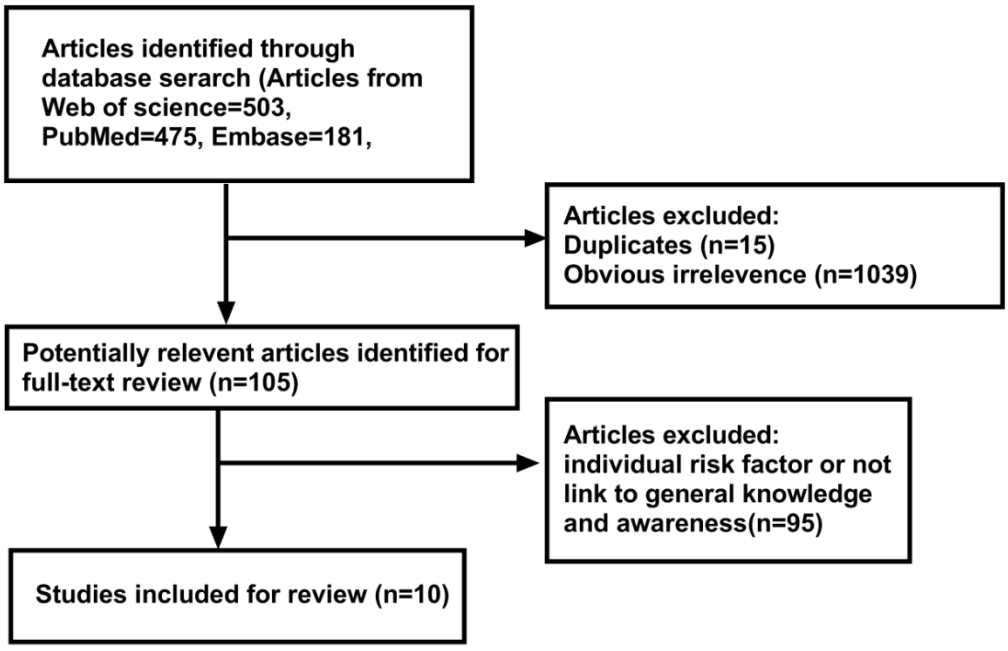

Fig. 1: The process of inclusion and exclusion of relevant articles

Table 1: Characteristics of included studies

Study/year/country	*Design and methods*	*Sample size*	*Study population*	*Quality&*
Majed Saad Al Fayi, (17) 2021, Saudi Arabia	Cross-sectional survey design	310 (F)	Women in the Asir region of Saudi Arabia, from younger than 20 to older than 50	Good
Sakina Ruhi,(18) 2020, Malaysia	Cross-sectional study	288(F)	Among women in Selangor, 18-55 years	Good
Xiequn Xu,(19) 2021, China	Cross-sectional study	274(142 F, 132 M)	Medical students from Peking Union Medical College	Good
Kui Son Choi,(20) 2015, Korea	Focus group interviews	29 (F)	Women of ages 30–69 years	Fair
Dania Hirsch,(21) 2009, Israel	The self-administered Illness Perception Questionnaire	110 (91 F, 19 M)	Patients with differentiated thyroid cancer (ages 23-83 years)	Fair
Ghulam Murtaza, (22) 2021, Pakistan	Cross-sectional study	3722 (3061 M, 661 F)	Pakistani University students (ages 15-40 years)	Good
Dounya Schoormans,(23) 2020, The Netherlands	Population-based survey	284 (67 M, 217 F)	Differentiated thyroid cancer survivors (Mean age 55.98)	Good
Omar Abdulziz Alzahrani,(24) 2021, Saudi Arabia	Cross-sectional observational survey	402(216F, 186 M)	Medical students from all colleges of medicine in Saudi Arabia (ages 18-25 years)	Fair
Megan R. Haymart,(25) 2020, America	Cross-sectional, population-based survey of patients aged 18 to 79 years	1597(1285 F, 312 M)	Patients diagnosed with differentiated thyroid cancer from the Georgia and Los Angeles County (ages 18-79 years)	Good
Yasser A. Abdulmughni,(26) 2004,Yemen	Retrospectively audited the records of 97 consecutive cases	97(87 F, 10 M)	Patients from the Kuwait University Hospital, Sana'a, Yemen	Fair

Knowledge of TC risk factors

To measure their knowledge of TC risk factors, participants were asked to correctly select them from a list. Among the studies included in this review, there are relatively few articles involving the knowledge and awareness survey of TC risk factors.

Smoking

In a study (22), 30.2% of college students knew that smoking was a risk factor for TC, and 17.2% of the participants strongly agreed that secondhand smoke played an important role in the formation of cancer. In another study (19),

45.3% medical students from a Chinese medical college thought smoking was a risk factor for TC.

Alcohol consumption

Seventeen percent Pakistani University students thought drinking alcohol as a risk factor for TC (22). In another study(19), 41.9% preclinical medical students (PMS) and 26.9% clinical medical students (CMS) thought drinking as a risk factor for TC.

Heredity (Family history)

The level of knowledge of heredity as a risk factor for TC ranged from as low as 9.3% in Pakistani University students (22) to 78.8% among medical students from a Chinese college (19). Moreover, CMS have the higher knowledge level than PMS (91.7% vs 66.9%). In a study (17), 68.5% of the participants have a correct understanding of the relationship between family history and TC. In a study (21), 49% of patients realized that their illness was linked to their family history.

Obesity

Obesity was reported as a risk factor for TC by 51.7% women (17) and 42.7% PMS and 34.5% CMS from a Chinese college (19).

Dietary habit

Knowledge of dietary habits as a risk factor for TC was reported by 7.2% of participants (22) in which about 6.8% of participants believed that eating red meat or processed meat was an important risk factor for developing cancer. 73.2% of participants regarded dietary habits as a risk factor for TC (17).

Stress (worry)

Stress (or worry) as a risk factor for TC was also reported in studies. In a study, 59% of patients with DTC believe that stress is related to their TC disease. In another study (19), stress as a risk factor was reported by 62.8% of medical students. Worry has a similar effect in TC patients. Patients who were overestimated tended to have more "worry" about disease recurrence and death than patients who were accurately evaluated (25).

Physical exercise

Physical exercise was identified as a risk factor for TC by 49.3% women (17), 10.5% Pakistani university students (22), in which they thought moderate physical exercise could reduce the risk of TC.

Other risk factors

Other TC risk factors were ageing, climate, radiation, and higher TSH levels. Ageing was reported as a risk factor for TC by 26.4% of Pakistani university students (17). Cold climate was reported by 16.9% among PMS and 73.1% among CMS (19), through the study of professional courses, the proportion is significantly increased. Radiation exposure was identified as a risk factor by 64.5% for PMS and 82.8% for CMS (19). Radiation was also considered as a risk factor by 25.3% of the participants (22). Higher TSH level was reported as a risk factor by 79% for PMS and 81.4% for CMS (19) .

Knowledge of symptoms of TC

Few studies included in this review involved knowledge and investigation of clinical symptoms of TC. Abdulmughni summarized the most common clinical presentations and physical findings including hoarseness (17.5%), pain (15.5%), dyspnea (13.4%), thyrotoxic symptoms (8.2%), dysphagia (4.1%), symptoms of hypothyroidism (3.1%) and multi-nodular swelling (43.3%), unilateral swelling (22.7%), solitary nodule (14.4%), diffuse swelling (14.4%), enlarged lymph nodes (9.3%) (26). 28.7% of students from Pakistani University could identify all symptoms of TC, while the proportion to identify a single symptom is varied: lump or swelling in neck (21%), pain in neck and sometimes in ears (11.5%), difficulty swallowing (9.6%), difficulty breathing or constant wheezing (9.6%), hoarseness that is not related to a cold (3.5%), cough that continues and is not related to a cold (5.7%) (22). The most frequently mentioned symptoms were fatigue and insomnia among TC survivors in the study by

Schoormans, with other symptoms including nausea, pain, dyspnoea, appetite, constipation and diarrhea (23).

Sources of information on TC

In the studies included in this review, there were few descriptions of information sources from which participants acquired knowledge about thyroid health. In a study by (19), 33.9% of PMS acquired knowledge about thyroid health from patients, 61.3% from media, and 9.7% from self-interest; 95.9% of CMS obtained relevant information from medical courses. The source of thyroid-related information was acquired from neighbors (30%), doctors (13.3%), media (13.3%), and newspapers (6.7%) (27). Ninety-seven percent of patients used the Internet to find information about treatment (94%) and symptom management (76%) (28). Many patients evaluated the quality of information by comparing different sources (71%), discussing it with their doctors (56%), or using trusted academic or government websites (53%). Thirty two percent of participants thought the online information was somewhat hard to understand, but 91% found it useful. About 60% of treatment decisions were influenced by online resources, and the information helps 50% of patients make decisions with their doctors.

Discussion

Despite the increasing incidence of TC worldwide, studies on TC knowledge and awareness and its risk factors are relatively inadequate. Although we did a thorough search within four databases, there are still only ten eligible articles were included. After the systematical review included articles, the findings showed that both the general population and medical students have relatively low to moderate levels of knowledge about TC and its risk factors. The level of knowledge for TC was low for 24.8%, 73.5% for moderate, and high for 1.7% (17). In a study (24), participants had high awareness of thyroid tumor screening (77.1%), but 58.5% had poor knowledge. Another study in medical students from a Chinese college compared PMS with CMS according to their grades, the results showed that CMS had a better understanding of thyroid cancer-related knowledge, suggesting the importance of professional course learning to improve knowledge and awareness. There was a correlation between educational attainment and overestimated recurrence rates and mortality risk (25). Increased levels of knowledge and awareness will help reduce thyroid cancer incidence and mortality. Therefore, authorities should take necessary measures to improve the level of knowledge and awareness among the general population. Increased levels of knowledge and awareness will help reduce thyroid cancer incidence and mortality. Therefore, authorities should take necessary measures to raise the level of knowledge and awareness among the general population.

To date, many risk factors for TC have been reported including smoking (29), alcohol consumption (30), iodine intake (31), stress (19), family history (32), higher TSH level (33), autoimmune thyroid disease (34), estrogen (35), obesity (36), diabetes (37), dietary habits (38), radiation (39), cold climate (40), age (41), physical exercise (42), and so on. Only a few of these risk factors were involved in the studies included in this review due to fewer eligible articles.

Healthy lifestyle and dietary habits are recommended to reduce cancer risk and overall mortality (43-45). However, rapid urbanization has led to a shift in epidemiological and nutritional patterns, with more energy-dense diets and more sedentary work and life patterns (46). Some traditional risk factors of TC thus are rising, such as obesity (17, 19, 22), diet (22, 47), and lowered physical activity (17, 22). As a result, the disease has also shifted from undernutrition and a highly active lifestyle to chronic metabolic diseases associated with overnutrition and a sedentary lifestyle. Interestingly, although participants were aware of the association between obesity and TC, they had no clear awareness that moderate physical exercise could reduce TC risk (17, 22). In addition, most participants did not consider high consumption of junk food and fried food as a

risk factor for TC (22), indicating a lack of knowledge. Clearly, such knowledge and awareness needs to be improved through the widespread dissemination of professional knowledge among the general population.

The consumption of alcohol as a risk factor for TC had different results in the two included studies. 31.4% of participants held a neutral views of the association between alcohol consumption and TC risk, meaning they were less convinced of the link (22). The percentages of participants who strongly agree or agree and strongly disagree or disagree are 17% vs 26.9% and 13% vs 11.7%, respectively. 41.9% of PMS and 26.9% of CMS thought that there is a link between alcohol consumption and TC risk (19). Drinking alcohol is popular in many countries and regions, which is often related to culture and religion. Despite the improved perceptions of the relationship between alcohol consumption and health, alcohol consumption, like smoking, is difficult to control effectively for long. Many countries have taken measures to intervene in drinking, such as banning driving after drinking and restricting advertising. However, some laws and regulations are not fully enforced and lack supervision (48).

The association between alcohol consumption and TC is also subtle. Unlike most of the other types of cancer, alcohol intake decreased the risk of TC (49, 50). However, because moderate to heavy drinking increases the risk of some other cancers and other adverse effects, the finding that alcohol consumption reduces the risk of TC has not been applied (51-53). Government departments should formulate relevant policy measures and supervision mechanisms to raise public awareness; otherwise, it is unlikely to change alcohol consumption behavior to reduce the risk of TC.

The relationship between stress and thyroid cancer is complex. Stress can be positive and increase adaptation ability; stress can also be negative, when it exceeds what we can handle, it can cause behavioral and physical problems (54, 55). Several studies have shown a strong association between stress and thyroid disorder (56, 57). However, beliefs and perceptions about the impact of stress on disease in a population may be related to a number of factors, such as environmental factors, educational problems, job stress, and economic burden. Therefore, some strategies are needed to deal with the psychological stress of such people (58).

This study also showed that the level of knowledge about thyroid cancer and its risk factors was related to the type of participants and level of education. Study that formally tested the difference between PMS and CMS regarding comprehension of TC, also reported a significant relationship (19). The level of knowledge and perception regarding TC was significantly higher in women with university education or above than in women with high school education or less (17). In addition, although the included studies did not analyze the influence of geographical distribution (urban or rural) on knowledge and cognition, in many other studies, geographical distribution has an important impact on knowledge and cognition, which may be attributed to the difference in education level and accessibility of various information sources(59, 60). These findings suggest that governments should improve infrastructure in rural areas and the education level of the people.

Communication is an important way of sharing information. Therefore, media exposure can significantly affect people's risk perception or behavior change (61, 62). This study also shows that the level of knowledge about TC and its risk factors is correlated with the level of media exposure. Clearly, the information transmitted by physicians to patients is the most direct and accurate. However, due to the limitation of medical resources, the difference in knowledge level between doctors and patients, and the avoidance of psychological burden on patients, the information communication and transmission between doctors and patients is often inadequate(61, 63). Traditional health information sources mainly include newspapers, foreign media, radio, television, and health workers. With the rise of network technology and new media technologies, many studies have shown that people prefer to access health information

through the Internet and social media, which clearly demonstrates the influence of the Internet and social media in the field of health care (64-70). This situation puts forward higher requirements for the authenticity, accuracy, and comprehensiveness of information. Regulators should formulate regulations to regulate the release of media information, especially health-related we-media and online advertisements (61).

Some limitations should be mentioned here. First, meta-analysis could not be performed due to the heterogeneity of the knowledge level evaluation criteria of the included studies. Second, it is difficult to show the extent to which educational level, cultural differences, and country level determine the level of knowledge and awareness due to the large variation in participants between studies.

Conclusion

Evidence provided in this review lays the foundation for the development of effective policy measures and surveillance mechanisms and the improvement of public health awareness in the future.

Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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