

Full Length Research Paper

The epidemiology of thyroid diseases in the Arab world: A systematic review

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Thyroid gland diseases are a public health problem worldwide. Imbalance in the regulation of thyroid gland hormones can cause many disorders that range from a small goiter to life threatening diseases, such as thyroid cancer. Thyroid dysfunction both hyper and hypothyroidism can affect circulatory system by affecting cardiac output, cardiac contractility, blood pressure, vascular resistance and rhythm disturbance which can further cause heart failure, fibrillation, congestive heart failure and blood pressure. Westernization and nutrition transition in Arab world have increased the burden of adenocarcinomas, including thyroid cancer. This review aims to present the aggregated burden, risk factors and prognosis of various thyroid diseases prevalent in Arab countries. An electronic databases search was conducted using PubMed in addition to searching of accessible local journals in Arab world, using keywords and terms like epidemiology, burden, odds, risks, etc. After applying exclusion and inclusion criteria, 21 articles were selected to include in this review. The review showed that the prevalence of different types of thyroid disease varied between the reported studies in Arab world ranging from 6.18 to 47.34% prevalence of goiter reported by several studies conducted in Arab world, such as Egypt, Algeria and Bahrain with 25.25, 86 and 1.7%, respectively. Gender, dietary factors, iodine deficiency, family history, diabetes and x-ray radiation were reported as risk factors associated with different type of thyroid diseases. The most prevalence of thyroid disease was concluded to be thyroid lesions which varied in different regions of Arab and the burden of thyroid cancer is very high and very common in different Arab region, and further longitudinal studies are still needed to investigate the prognosis and determinants of these thyroid diseases in the Arab world.

Key words: Thyroid disease, prevalence, burden, odds, odds ratio, risk factors.

INTRODUCTION

Thyroid gland is the hormone secreting organ that regulates body metabolism (Skarulis and Stack, 2015).

Imbalance in the regulation of these hormones can cause many disorders that range from a small goiter to life

threatening diseases, such as thyroid cancer (Ratini, 2015). The most common cause of thyroid disorders is iodine deficiency and literature shows that almost one-third of the world's population lives in the area of iodine deficiency (Zimmermann, 2009). Thyroid lesion can be classified into congenital malformations, inflammatory in origin, endocrinal and neoplastic in origin (benign and malignant).

Several previous studies had reported that the most common type of thyroid disease is goiter; simple, diffuse and physiological (Vanderpump, 2005), and hypothyroidism and hyperthyroidism are also the prevalent types of thyroid disease (Vanderpump, 2010). Moreover, thyroid cancer is the fifth most common cancer in women (Jemal et al., 2010) and second most common cancer in Italy (Dal Maso et al., 2011). Hence, the thyroid gland disease is among the most common endocrine cancer, with approximation of 1.0 to 1.5% of all new cancers diagnosed each year in the USA, and its incidence has continuously increased in the last three decades all over the world (IARC Scientific Publications).

Furthermore, thyroid dysfunction both hyper and hypothyroidism can affect circulatory system by affecting cardiac output, cardiac contractility, blood pressure, vascular resistance and rhythm disturbance which can further cause heart failure, fibrillation, congestive heart failure and blood pressure (Klein and Danzi, 2007). It has been reported that changing in life styles in Arab world has led to the emerging of double burden of diseases, including the thyroid related diseases.

The westernization lifestyle and nutrition transition in Arab world have increased the burden of adenocarcinomas, including thyroid cancer (Sawka et al., 2008). Thyroid cancer occupies the number two position among females in Saudi Arab (Sawka et al., 2008). Secondary to westernization and the life-style of Arab countries has changed over the past years and thus the burden of thyroid diseases, specifically cancer, is increasing, which further contributes to the economic crises.

To date and best knowledge of the authors, no systemic review has been conducted in our region to highlight and consolidate the prevailing data on thyroid disease. Thus, this review aims to present the aggregated burden, risk factors and prognosis of various thyroid diseases prevalent in Arab countries.

METHODOLOGY

An electronic search was conducted using PubMed database during October 2014, in addition to searching of accessible local

journals in Arab world. Inclusion criteria included: articles written in English language, articles describing or investigating the epidemiology, etiology, distribution, prognosis, impact and burden of thyroid diseases in Arab countries and publication date 2014. Consequently, case reports, clinical trials, including the preventive measure and treatment articles about pathological, histological premalignant, and malignant change regarding thyroid cancer were excluded (Figure 1). Then, the search results were reviewed by two authors: the first author and one co-author to identify which articles were relevant to the topic through screening the title and abstract. The search keywords used covered three main categories including thyroid diseases, epidemiological attributes and thyroid diseases geographical location. Boolean (OR/AND) were used to link all the search keywords. The main keys words were "Distribution", "Epidemiology", "Burden", "Incidence", "Pattern", "Diagnosis", "Etiology", "Risk Factors", "Odds", "Odds ratio", "Risk", "Rate", "Prevalence", "Trend", and "Prognosis" with combination of all Arab countries like Algeria, Iraq, Kuwait, Sudan and Yemen (Figure 2). The initial screening of title/abstract of 40 identified articles resulted in excluding 16 articles as they were case reports, clinical trials and treatment based articles. The remaining 24 full text articles were reviewed thoroughly by two reviewers and found 3 further articles related to genetics were excluded. Finally, only 21 articles were included in this review. The flow chart attached is given to highlight the process and sequence of article identification, evaluation and selection (1). The secondary research was performed to check the cross-referencing among the final list of the 21 articles searching for local specialized journals in Arab world, but no additional article was found through secondary search. The review results were classified according to the types of studies that are cross-sectional studies, case control retrospective and prospective studies. The studies that reported prevalence of different thyroid lesions, risk factors and studies conducted solely on thyroid cancer were further differentiated.

RESULTS

Study design

The review results showed different study designs as follows: seven cross-sectional studies were conducted in different Arab regions, including Libya, Saudi Arabia, Egypt, Algeria, Bahrain and Oman (El-Mougi et al., 2004; Ghawil et al., 2011; Henjum et al., 2010; Lamfon, 2008; Moosa et al., 2000; Nouh et al., 2008; Elbualy et al., 1998). The sample size found varied from 99 to 749 subjects except for one study conducted in Oman in which 36000 babies were diagnosed. The study population of these studies comprised of children of school age and adults: five studies were case control with sample size varying from 100 to 313 subjects (Akbar et al., 2006; Memon et al., 2002a, b, 2004, 2010); four of the studies were from Kuwait (Memon et al., 2002a, b, 2004; Memon et al., 2010); and one from Saudi Arab (Akbar et al., 2006),

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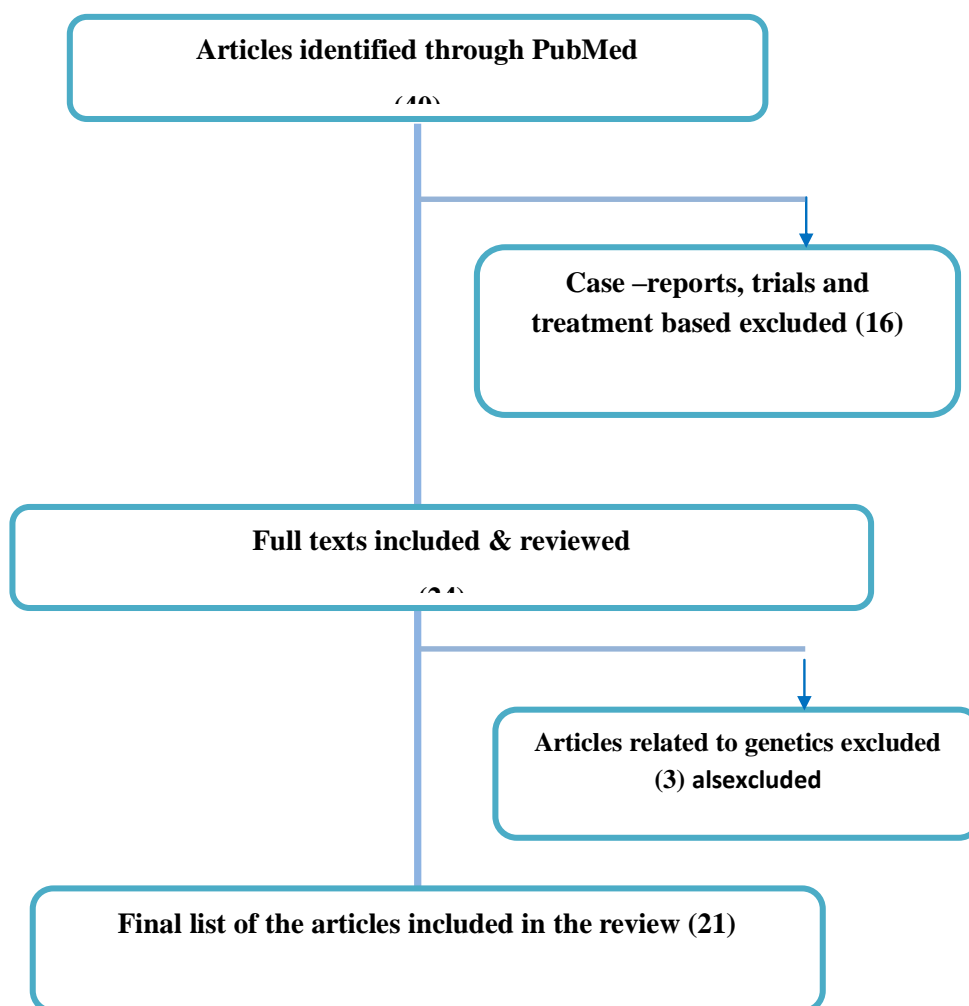


Figure 1. Flow Chart for Systematic Review.

and the study population was recruited from hospitals in Kuwait and Saudi Arab, retrospectively, and eight studies were retrospective; three were from Yemen one from Iraq (Nasheiti, 2005), three from Saudi Arab and one from United Arab Emirate. The sample size was found to vary from 45 to 810 subjects and comprised of children and adults, and all data collected were hospital based. One study conducted in Saudi Arab was prospective (Bahamman et al., 2011) (Table 1).

Prevalence of thyroid lesions

Different thyroid diseases were reported in different studies that include hypothyroid, hyperthyroid and goiter. The prevalence of different types of thyroid disease varied between the studies. The study conducted in 2011 in Libya reported the prevalence of subclinical hypothyroidism as 2.3% (Ghawil et al., 2011), and

prevalence of hypothyroidism was reported as 6.18% in Libya (Nouh et al., 2008) and 47.34% in Saud Arabia (Makkah region) (Lamfon, 2008) and the prevalence of goiter was reported by many studies conducted in Egypt, Algeria and Bahrain (25.25, 86 and 1.7%, respectively) (El-Mougi et al., 2004; Henjum et al., 2010; Moosa et al., 2000).

Risk factors

Different risk factors were identified by different studies included in the review. The prevalence of thyroid diseases reported was found to be more prevalent in females than males. The study conducted in Iraq in 2005 reported that the female to male ratio of congenital primary hypothyroidism was 1.6:1 (Nasheiti, 2005), and studies conducted in Yemen in 2005 and 2004 reported higher prevalence of thyroid cancer in female than in

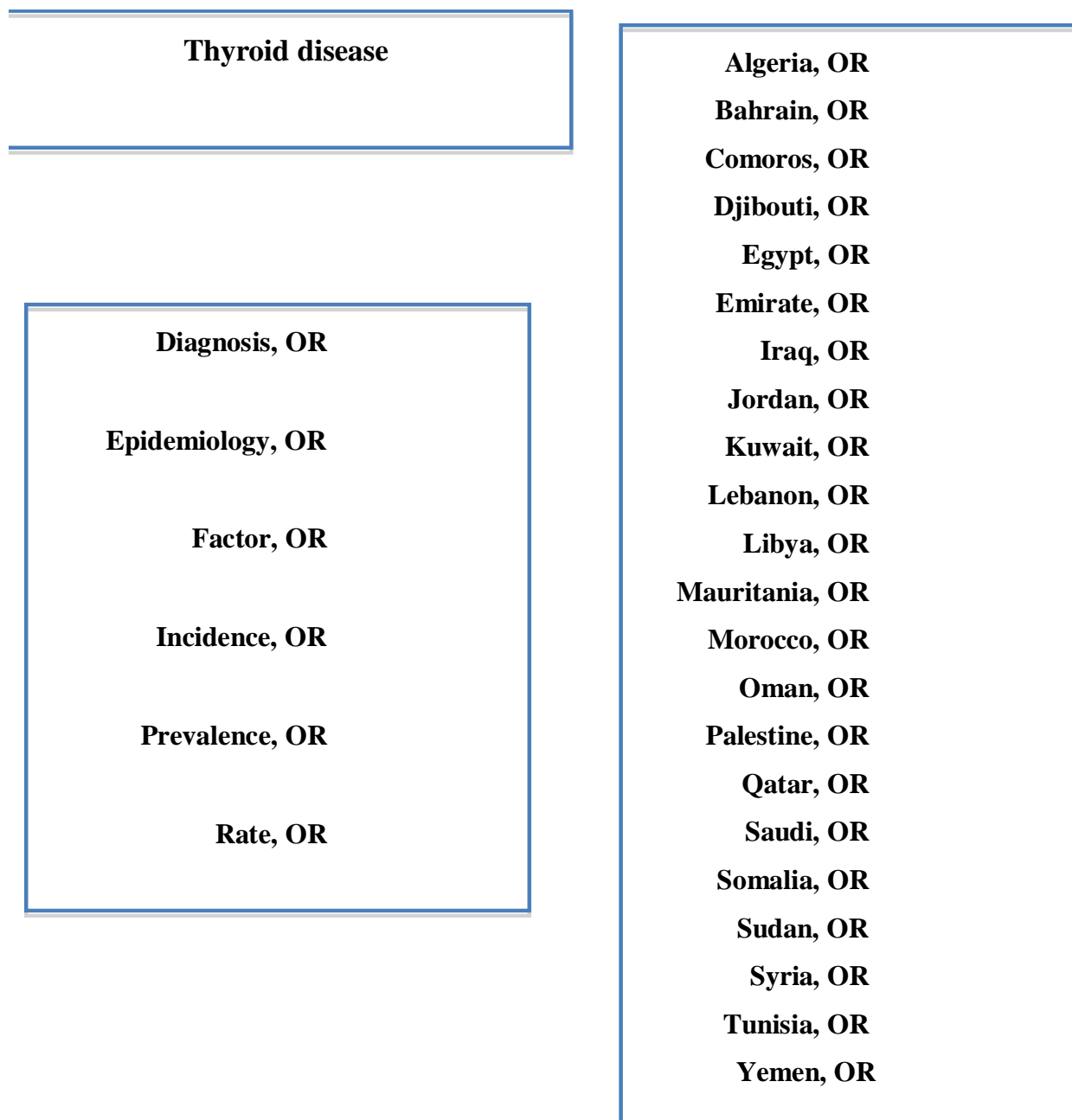


Figure 2. Search strategy: keywords.

males, that is, 90 and 89.7% respectively (Abdumughni et al., 2004; FCPSP, 2005). The bad nutrition and iodine deficiency was reported as risk factors in study conducted in Makkah (Lamfon, 2008), and iodine deficiency in Egypt was also reported in 31.3% of school aged children by estimating urinary concentration of iodine (El-Mougi et al., 2004). A case control study conducted in 2005 in Saudi Arab among diabetic patients reported that 16% of the cases had thyroid dysfunction

(Akbar et al., 2006), and one cohort study reported that the study participant having sleep disorder had high prevalence of subclinical hypothyroidism compared to the newly diagnosed clinical hypothyroidism. One retrospective study conducted in Iraq in 2005 documented that patients with hypothyroidism 89% had congenital hypothyroidism and 60% were from urban areas and more than half had parental consanguinity and family history of hypothyroidism (Nasheiti, 2005) (Table

Table 1. Summary of studies included in the systematic review.

Author, year, reference	Country	Population	Sample size	Study design	Main findings
Cross-sectional Studies					
Millad (2011)	Libya	Pediatric Department, Tripoli Medical Center	218 TIDM	Cross-sectional	23.4% had TPO-Ab (66.6%=female), 7.9% had TG-Ab and 2.3% had subclinical hypothyroidism
Ali (2008)	Libya	Murzok City	356 Adults	Cross-sectional	Overt hyperthyroidism= 0.84%, subclinical hyperthyroidism = 0.84%, overt hypothyroidism = 1.12%, and subclinical hypothyroidism =6.18%thyroid dysfunction was more common in females higher prevalence of subclinical hypothyroidism 27%=subjects with hypercholesterolemia.
Hawazen (2008)	Makkah	Al-Noor , Hera and King Abdul Aziz hospitals	414 Patients with thyroid diseases	Cross-sectional	196= hypothyroidism, 195=hyperthyroidism. Hypothyroidism: psychic, congenital, diabetes, autoimmune thyroiditis (Hashimoto thyroiditis , Grave disease) and malignant thyroid were in males. Bad nutrition, iodine deficiency, goiter and benign thyroid cancer were increased in females. Hyperthyroidism, iodine deficiency, and benign and malignant thyroid cancer revealed increase in males. Bad nutrition and goiter were increased in females.
El-Mougi (2004)	Egypt	Cairo University children's hospital.	99 School aged children	Cross-sectional	Goiter in 25 children. Median urinary iodine concentration was 70 µg/L. Mild iodine deficiency (50 to 99 µg/L) in 60.6% of the children and moderate to severe deficiency (<50 µg/L) in 31.3%.
Sigrun (2002)	Algeria	4 camps of Algerian desert	421 Children aged 6-14 years	Cross-sectional	The prevalence of goiter based on Tvol-for-BSA was higher (86%) than the prevalence of goitre based on Tvol-for-age (56 %). 84% had UIC above 300 mg/L.
Moosa (2001)	Bahrain	Government school	749 Children aged 8-12 years	Cross-sectional	1.7% had goiter,16.2% had low level of urinary excretion.
Musallam (1998)	Oman	Royal and Khoula Hospital	Diagnosis of 36,000 babies	Cross-sectional	Incidence of congenital hypothyroidism: 1:2200
Case-Control Studies					
Anjum (2010)	Kuwait	KCCC	313 Patients with thyroid cancer,313 matched controls	Case-control	Exposure to dental x-rays was associated with an increased risk of thyroid cancer (OR 2.1, CI: 1.4-3.1) dose-response pattern

Table 1. Cont'd.

Akbar (2005)	Saudi Arab	KAUH	100 Saudi type 2 diabetics and 100 age and sex-matched controls	Case control	Thyroid autoimmunity were detected in 10% diabetics vs. 5% controls (p=0.05). Thyroid dysfunction in 16 and 7% respectively (p=0.03). In GAD65ab-positive diabetics, thyroid autoimmunity: in 27% vs. 4% GAD65ab-negative diabetics (p=0.02) and thyroid dysfunction was reported in 42% and 7% respectively
Memona (2003)	Kuwait	KCCC	313 Case-control pairs of cancer	Case-control	Family history of BTDC= 24.9% cases, 12.8% controls. Risk of TC in individuals who had a mother (OR=2.3; CI:1.1–5.1), sister(s) (OR=2.6; CI:1.3–5.3) or aunt(s) (OR=2.1; CI: 0.9–5.3) with BTDC; Increased risk with an increasing number of affected female relatives (P<0.0001). Individuals aged <35 years, who had an affected first- or second/third-degree relative(s), 3-fold increased risk of the cancer. Family history of TC was reported by 2.9% cases in 13 relatives (OR=3.0; CI:0.811.1).
Memon (2002)	Kuwait	KCCC	313 Case of thyroid cancer control pair	Case-control	12 years of education: 0.6 OR, CI:0.3-0.9. Average age at diagnosis: 34.7 in women, 39 in mal. High consumption of processed fish and chicken were associated with thyroid cancer 2.2 (1.6-3); 1.7 (1.2-2.3)
AnjumMemon (2002)	Kuwait	KCCC	238 Women with cancer and 476 matched controls	Case-Control	12 years of education reduced risk of thyroid cancer (OR 5 0.4; 95% CI: 0.2–0.8; <0.05). Average age at diagnosis 34.7 +/- 11 years. Significant association was found between: age at last pregnancy, parity, last pregnancy at ages >30 years (2.1; CI:1.2-3.8), borne >5 children (OR 1.5; CI: 0.9–2.5)
Retrospective Studies					
Abdulkader (2014)	Saudi Arab	King Fahad Hospital, Madinah	292 Thyroid specimens	Retrospective	Female: Male = 3.70:1. Mean age= 39.7 years. Most common cause of goiter= colloid goiter. Female: Male 4:1. 27.7% had neoplastic tumor. Papillary carcinoma was the commonest malignant tumor accounting for 87.8% of all thyroid malignancies, followed by lymphoma, follicular carcinoma and medullary carcinoma
AlZaher (2008)	UAE	Tawam Hospital	Medical Record of 135 TC patients	Retrospective	58% diagnosed before age 45. Female: Male 2.4:1. Papillary carcinoma: 84%; Multinodular: 63%
Nasheiti (2005)	Iraq	Al-Kadhymia Teaching Hospital College of Medicine, Al-Nahrain University	45 children under 12 years with hypothyroidism	Retrospective	Hashimoto thyroiditis =11.1%. Congenital primary hypothyroidism =88.9%. Of the latter group, 60%= urban area. Female: Male= 1.6:1. Parental consanguinity = 80%. 60.7% had family history of hypothyroidism

Table 1. Cont'd.

Mansour (2005)	Yemen	Al-Kuwait University Hospital, Al-Thawra Teaching Hospital	810 Surgical operated goiter cases	Retrospective	90%= females. DTC was found in 21% cases, including 86.4% females and 13.6% males. 60% of the cases were in the age group of 21-40 years. Papillary carcinoma was the most common type of DTC (164 cases, 96.5%).
Yasser (2004)	Yemen	Kuwait University Hospital, Sana'a, Yemen	97 TC cases	Retrospective	Patients with TC comprise 17.7% of goiter patients. Females = 89.7% (n=87) and males =10.3% (n=10). The average age of diagnosis = 38.4 years. Among patients with goiter, the carcinoma was higher in the males 37.9% patients aged >47 25.8%, patients with enlarged lymph nodes 9.3% and patients with recurrent disease after being operated for a benign disease 8.2%. 90% = Highland areas. Clinical finding: Multinodular swelling (43.3%). Common symptom: Hoarseness (17.5%). Papillary carcinoma= 93.8% of the cases. Common procedure: Sub- total thyroidectomy (39%).
Faiza (2004)	Saudi Arab	King Abdul Aziz University Hospital	45 TC patients	Retrospective	37.5% patients had histopathology confirmed diagnosis, 82.2% cases of papillary carcinoma. Males: Female's ratio is 1.1:1, 66.7 had nodular mortality rate: 2-.2
Khalid (2003)	Yemen	Kuwait University Hospital	667 Patients with goiter	Retrospective	Females =92.5%, mean age = 35.2±11.58 years, 93%= highland. Clinical finding: Multinodular (44.9%). Common symptom = dyspnoea (20.5%). Common histopathological finding= nodular, colloid goiter (62.8%). Common procedure: Subtotal thyroidectomy. Common postoperative complication =hypocalcaemia
Saeed (1993)	Saudi Arab	Asir Central Hospital	361 Thyroid Specimen	Retrospective	Mean age: 35.9. Female to Male: 4.5:! 68.3%: Multinodular goiter, adenoma thyroid malignancy: 13%. Papillary carcinoma: 65.9%
Prospective Study					
Salman (2011)	Saudi Arab	Sleep Disorder Center	347 Patients having sleep disorder (271 with OSA, 76 Non OSA)	Cohort	Among OSA: prevalence of newly diagnosed hypothyroidism: 0.4%, newly diagnosed subclinical hypothyroidism: 11.1%. Non-OSA patients, the prevalence of newly diagnosed clinical hypothyroidism: 1.4%, and newly diagnosed subclinical hypothyroidism: 4%.

KCCC: Kuwait Cancer Control Centre; BTD: Benign thyroid disease; TC: thyroid cancer; OR: odds ratio; CI 95%, confidence interval; CH: congenital hypothyroid; TSH: thyroid stimulating hormone; NAFLD: non alcoholic fatty liver; MU/L: milli-unit per liter; GAD65ab: glutamic acid decarboxylase; KAUH: King Abdulaziz University Hospital; DTC: differentiated thyroid cancer; T1DM: type 1 diabetes mellitus; TPO-Ab: anti-microsomal peroxidase antibodies; TG-Ab, antithyroglobulin antibodies.

1).

Thyroid cancer

The nine studies included in this review had reported risk factors and clinical findings of thyroid cancer. Study conducted in 2010 in Kuwait reported dose-response relationship between dental x-ray and thyroid cancer (Memon et al., 2010). Another study from Kuwait conducted in 2003 reported association between family history of benign thyroid disease and thyroid cancer (Memon et al., 2004). Case control study conducted in 2002 in Kuwait reported that in female factors, such as age at last pregnancy, parity, pregnancy at age of 30 and above was associated with the increased risk of thyroid cancer (Memon et al., 2002). The papillary carcinoma was more prevalent in Yemen in 2005 and 2004 than any other types of cancer (96.5 and 93.8%, respectively). Both studies concluded that proportion of cancer was higher in female than male (Abdumughni et al., 2004; FCPSP, 2005). Likewise, study conducted in Saudi Arab and UAE also reported high proportion of cancer in female than male and the prevalence of papillary carcinoma is higher than the other types of cancer (Abu-Eshy et al, 1995, Albasri et al, 2014, Al Zahir et al 2008, Qari, 2004) (Table 1).

DISCUSSION

Our review has covered wide variety of thyroid diseases, including hypothyroid and hyperthyroid, goiter, subclinical thyroid, congenital hypothyroid, hashimoto thyroid disease and thyroid cancer.

The prevalence reported and study sample size varied from one study to another study. The prevalence of subclinical hypothyroidism was reported as 2.3 times in adult population of Libya (Ghawil et al., 2011) compared with study conducted in Colorado documented that the prevalence of subclinical hypothyroid in the general population ranged between 4 and 10% (Canaris et al., 2000). So, our review suggested that the prevalence in Arab region is comparatively low. This could be due to the small sample size that has been used in the study. Prevalence of hypothyroidism was reported as 6.18% in Libya and 47.34% in Saudi Arabia (Lamfon, 2008; Nouh et al., 2008) showing the prevalence is much higher than the prevalence reported in the study conducted in Scotland of 0.135% prevalence in people of age less than 22 years (Hunter et al., 2000). The possible explanation of the high prevalence in study conducted in Saudi Arabia could be because of the reasons and risk factors mentioned in the study that the iodine deficiency and bad nutrition. Furthermore, the sample size and variation in participants' characteristics could have

resulted in different prevalence of thyroid lesions.

This study review showed that the prevalence of goiter was in studies conducted in Egypt, Algeria and Bahrain (25.25, 86 and 1.7%, respectively) (El-Mougi et al., 2004; Henjum et al., 2010; Moosa et al., 2000). The possible explanation for the high goiter in the study of Algeria was due to high intake of iodine, and the result is line with a study conducted in 1998 among the Saharawi refugees that showed a prevalence of 28% for goiter (Pezzino et al., 1998). Some recent studies showed higher prevalence as the recent one had used ultrasound. The study conducted in past years in Oman and Saudi Arab showed 10 and 30% goiter of grades 1 and 2, respectively (Al Nuaim, 1995; Oman Ministry of Health, 1995). This high prevalence of goiter in Arab world is in agreement with the high prevalence encountered in countries, such as in Turkey, where goiter prevalence ranged from 5 to 56%, indicating severe to moderate iodine deficiency (Erdoğan et al., 2002). However, the variation in the prevalence of different thyroid lesions in Arab world could be because the study methods, including different sample size, participant characteristics, source of recruitment of participants, and different tools, were used to identify the burden and different underline causes, such as high intake of iodine and bad nutrition.

The thyroid cancer was found prevalent in Arab region in this review similar to the study finding from India where the thyroid cancer was found to be one of the five most common cancer in India (Kalyani et al., 2010); whereas in Iranian population, thyroid cancer is the 7th most common cancer in females with an overall 5-year survival rate of 88% (Khayamzadeh et al., 2011). Moreover, in a study spanned over 25 years about the incidence of common cancers in Hong Kong, a number of cancers including thyroid cancers were found to be on an increase throughout the study period (Xie et al., 2012). Likewise, a study from Nepal on head and neck carcinomas reported that the most common site of primary lesion was larynx, followed by the thyroid (Lasrado et al., 2012).

The different studies included in this review have commented on the risk factors, clinical presentation and symptoms of thyroid cancer. Female predominance can be seen in our review and the common type of cancer was reported as papillary carcinoma. These findings are in agreement with the findings of study conducted in Iran over the period of 2000 to 2010 (Sokouti et al., 2013). The thyroid diseases as reported in this review are all multi-factorial. For example, as reported in the study of Kuwait that age at last pregnancy, parity, last pregnancy at ages >30 years were all associated with thyroid cancer. These finding are in agreement with what was mentioned in study done in Iran that TG-Ab and TPO-Ab were identified more frequently in women with recurrent abortions (Iravani et al., 2008). A study conducted in Kuwait in 2003 reported the association between benign

thyroid disease and thyroid cancer (Memon et al., 2004). This findings are inconsistent with the study among Iribarren et al. (2001) which included 196 incident cases of thyroid cancer, and reported an approximately 2-fold increased risk with a family history of thyroid disease (Relative Risk (RR) = 2.2; 95% CI: 1.2–4.1) (Iribarren et al., 2001). In addition, Helene et al., from a case-control study reported that seventeen cases (5.0%) and 2 controls (0.6%) reported at least one first degree in relation with thyroid cancer thus suggesting that genetic factors are important for thyroid cancer. Pal et al. (2001) showed that irrespective of the type of disease, the male to female ratio is higher for female having any type of thyroid disease. These findings are consistent with studies conducted in different countries. For example, the study conducted in Norway in 2000 concluded that the prevalence of former diagnosed hyperthyroidism was 2.5% in females and 0.6% in males, hypothyroidism 4.8 and 0.9%, and goiter 2.9 and 0.4% respectively. In both sexes, the prevalence increased with age (Bjoro, 2000).

Another interesting finding in this review is that the study conducted in Kuwait reported the association of Dental X-rays with thyroid cancer. These findings are consistent with the findings from number of previous studies, including a case-control study conducted in Sweden reporting the association of dental x-rays with thyroid cancer. A cross-sectional study also reported this association (Hallquist and Näsman, 2001), and cohort study conducted in USA also reported that x-ray workers had more risk of developing cancer than the other specialties (Zabel et al., 2006).

The limitations of this review includes limiting our search for articles in English, however, most if not all, studies by research institutes and universities are in English in the Arab world. Some articles might have been missed because different databases, like KoreaMed and Embase, were not search into but local journals were reviewed to include all the study related to the Saudi Arab. Publication bias, which is the tendency for publishing manuscripts positive findings, is a potential limitation of all systematic reviews including our review. Limitations of this systematic review also derive from limitations of the individual studies included. Most of the studies conducted in Saudi Arabia were cross-sectional and retrospective with very few follow-up studies that aim to know the prognosis, burden and consequences of these conditions on the society and healthcare services. On the other hand, the strength of this review to the best of our knowledge is the first review that highlights the burden of thyroid diseases in Arab world. Secondly, this review has included considerate amount of studies from many geographical territory of Arab, including Saudi Arab, Jordan, Yemen, Algeria, Kuwait, Egypt, etc. This study includes all the diseases that have been studied in Arab region such as hypothyroidism and hyperthyroidism, goiter, Hashimoto's disease, Graves' disease and thyroid

cancer. The review has, to the best of its ability, consolidated the epidemiology, including prevalence of different types of thyroid diseases, the risk factors and clinical features of different thyroid diseases including thyroid cancer. Different study designs, such as cross-sectional, retrospectives and case-controls were included to highlight the true burden of the disease.

Conclusion

Prevalence of thyroid varied in different regions of Arab and the burden of thyroid cancer is very high and very common in different Arab region. Risk factors, such as female gender, bad nutrition, and diabetes and x-ray radiations were highlighted in the studies. Identified risk factors are potentially modifiable, emphasizing the importance of public health programs that are aimed at tackling such determinants. Future longitudinal studies are needed to investigate the prognosis and determinants of this condition in the Arab world. This study recommended early detection and prevention of disease at primary level by educating the population should be practiced.

Conflict of Interests

Authors have no conflict of interests and the work was not supported or funded by any drug company.

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