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STUDY ON IMPACT OF OCCUPATION, INDUSTRIAL AREA, ENDOSULPHAN, ENVIRONMENTAL POLLUTION, AND ROOF OF RESIDENCE ON THE PREVALENCE OF THYROID DISEASES IN DAKSHINA KANNADA AND KASARAGOD DISTRICTS OF WEST COAST OF INDIA

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ABSTRACT

The objectives of the present investigation were to find out the correlation between thyroid abnormalities and environmental pollution, occupation, industrial area, endosulphan and roof of residence used by human population. Two study groups were surveyed for the study of the prevalence of thyroid diseases. One study group is from Dakshina Kannada and the other Kasargod Districts of West coast of India. A total of 398 subjects were surveyed. Questionnaires were prepared and distributed to conduct the survey. Hypothyroidism is 36.2% in Dakshina Kannada, where as it is 54.6% in Kasargod. Hyperthyroidism is 24.7% in Dakshina Kannada where as it is 17.8% in kerala.39.1% of subjects were normal in Dakshina Kannada, whereas 27.1% were found to be normal in Kasargod.

INTRODUCTION

Thyroid disorder is a general term representing several different diseases involving thyroid hormones and the thyroid gland. Thyroid disorders are among the most common endocrine disorders in India. Thyroid disorders are commonly separated into two major categories, hyperthyroidism and hypothyroidism, depending on whether serum thyroid hormone levels are increased or decreased, respectively. Thyroid diseases are, arguably, among the commonest endocrine disorders worldwide. India too, is no exception. According to a projection from various studies on thyroid disease, it has been estimated that about 42 million people in India suffer from thyroid diseases. Among the various varieties of hypothyroidism, congenital hypothyroidism is probably the most important, as it is requires an early diagnosis, which is usually followed by appropriate therapy that can prevent the onset of brain damage (Ambika *et al.,* 2011). The link between endemic goiter and iodine deficiency has been researched in India by several eminent researchers, and this has led to the publication of several important reports. Critical research has resulted in endemic goiter being reported from all over the country and not just from the Himalayan and Sub-Himalayan regions. Researchers from New Delhi had shown that this was linked to iodine deficiency and that this resulted in decompensate hypothyroidism in many cases. This led to landmark studies which showed that iodine deficiency was associated with hypothyroidism in neonates, setting the scene for the now legendary salt iodization program supported by the Government of India. Subsequent to this program, it was shown that in selected regions of Uttar Pradesh, the prevalence of congenital hypothyroidism had come down from 100/1000 to 18/1000 (Desai., 1917). A prospective epidemiological study was conducted to assess the incidence, diagnosis, of thyroid gland abnormality in northern Finland by Klein and

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Ojamaa, 1992. erhard *et al.,* 1999 reported that, Pentachlorophenol (PCP) is a chemical used in industry and agriculture. We are exposed without even knowing it exists. It is used as a wood preservative and produces toxic by-products that contaminate our air, food and water. It too is linked to alteration of thyroid hormones and the formation of a goiter. Industrial compounds such thyroid disruptors are now ubiquitous, persistent environmental contaminants routinely found in samples of human and animal tissues (Boas *et al.,* 2006. Massart *et al.,* 2007 reported that in humans, adverse health outcomes such as neuro developmental toxicity, goiter and thyroid diseases are associated with TH disruption.' Several landmark studies have been carried out in the area of iodine deficiency disorders in the country. About 14,762 children from all over India were studied for the following characteristics: goiter prevalence, urinary iodine and thiocyanate excretion, functional status of the thyroid, as well as serological and cyto pathological markers for thyroid autoimmunity.

The authors suggested that despite iodization, the prevalence of goiter has not dramatically declined. The researchers noted that thyroid autoimmunity could only partly explain the goiter and concluded that the role of goitrogens is an area that deserves further study (Usha Menon *et al.,* 2009). Abnormalities of thyroid function are usually related to production of too little thyroid hormone (hypo-.thyroidism) or production of too much thyroid hormone (hyperthyroidism). Hypothyroidism, or an under active thyroid, has many causes. Some of the causes are prior thyroid surgery, exposure to ionizing radiation, chronic inflammation of the thyroid (autoimmune thyroiditis), iodine deficiency, lack of enzymes to make thyroid hormone and various kinds of medication (Anupama Shukla and Prabhdeep Kau., 2009). In a landmark study of Hashimoto's thyroiditis in India, 6283 schoolgirls from all over the country were screened. Among them, 1810 schoolgirls had a goiter. Among them 764 subjects underwent a fine needle aspiration cytology, and of these subjects, 58 (7.5%) had evidence of juvenile autoimmune thyroiditis (the term included both Hashimoto's thyroiditis and focal lymphocytic thyroiditis). Among fine needle aspiration cytology-confirmed cases of juvenile autoimmune thyroiditis, subclinical and overt hypothyroidism were seen in 15% and 6.5%, respectively (Marwaha *et al.,* 2000).

Over the last 30 years many publications have suggested an association between Down syndrome and thyroid disorders by showing altered levels of abnormal thyroxine (T4), triiodothyronine (T3) and/or thyroid stimulating hormone (TSH) level. Such changes may be present along with other hormonal and biochemical disturbances (Prasher, 1999.). Remya James and Vineeth Kumar., 2012 Studied on the Prevalence of Thyroid Diseases in Ernakulam City and Cherthala Town of Kerala State, India. Wrushali and Raut., 2012 reported on Thyroid Disease Diagnosis using Image Processing. Thyroid is among the most important organs of human body which have a high influence on the performance of other body parts. Since thyroid hormones are responsible to control the body metabolism, the performance of the thyroid gland directly influences each of the main body. Veeresh, *et al.,* 2015 reported on Serum FSH, LH and Prolactin Levels in Women with Thyroid Disorders. The studies include 36 women patients between the age group 18-35 years out of which 10 are control, 26 are with thyroid disorders. In this 26 thyroid disorder patients 16 are hypothyroid cases and 10 are hyperthyroid cases. Aliyu *et al.,* 2015 reported on Simple Multinodular Goiter of about 248 patients, 216 were females and 32 males with a female to male ratio of 6.75:1. A cross sectional study of prevalence of hypothyroidism in adult population of Udayapur district was reported by Rakesh *et al.,* 2015.

Study Area

Dakshina Kannada is an important district of Karnataka state situated on the western coast of India. It is long narrow strip of territory and from east to west it is broken low plateau, which spreads from the Western Ghats to the Arabian sea. Dakshina Kannada district has an area of 4866 square kilometer which stretch from 12º 57' and 13º 50¹ north latitude and 74º & 75º 50¹ east longitude. The Arabian sea bounds it on the west. Mangalore is the head quarters and chief city of the district. The climate of the district shares the wider climatic pattern of the other West Coast districts of India. It is characterized by excessive humidity (78%) during the greater part of the year. Kerala is sandwiched between the Lakshdweep Sea and the Western Ghats. Lying between north latitudes 8°18' and 12°48' east longitudes74°52' a77°22', Kerala is sandwiched between the Lakshadweep sea and the western ghats. Lying between north latitudes 8°18' and and east longitudes and Kerala experiences the humid equatorial tropic climate. The state has a coast of 590 km (370 mi) and the width of the state varies between 11 and 121 kilometres (7 and 75 mi) Kasargod District is one of the 14 districts in the state of Kerala India. The district covering an area of around 1992 km², is located at 12.5ºEN 75.0º It has an average elevation of 19 metres (62 feet).

MATERIALS AND METHODS

A standard set of Questions were grouped together and a Questionnaire was prepared. Each and every patient was asked the questions and their answer was carefully recorded. The thyroid blood reports of majority of the persons were noted. This study is conducted to analyze the factors associated with incidence of Thyroid in persons residing in Dakshin Kannada and adjoining districts. A questionnaire was prepared to collect the data. The hospitals and clinics were visited and the details of persons affected by thyroid are collected from them. The patients were interviewed either at clinics or at their residence. Statistical analyses were calculated using SPSS- 16.0.

RESULT AND DISCUSSION

A total of 398 subjects were interviewed from Dakshina Kannada and Kasargod district from January 2014 to December 2015. Hypothyroidism is 36.2% in Dakshina Kannada, where as it is 54.6% in Kasargod. Hyperthyroidism is 24.7% in Dakshina Kannada where as it is 17.8% in kerala.39.1% of subjects were normal in Dakshina Kannada, whereas 27.1% were found to be normal in Kasargod (Fig.1). Prajwal et al,. 2016 was also reported same result about impact of localities, sex ratio, age group, religion and food habits on the prevalence of thyroid diseases in Dakshina Kannada and Kasaragod districts. To find any association between the levels of thyroidism with the occupation of subjects state Chi square test is carried out and found that there is no significant association between levels of thyroidism with the occupation of subjects (p=0.08).

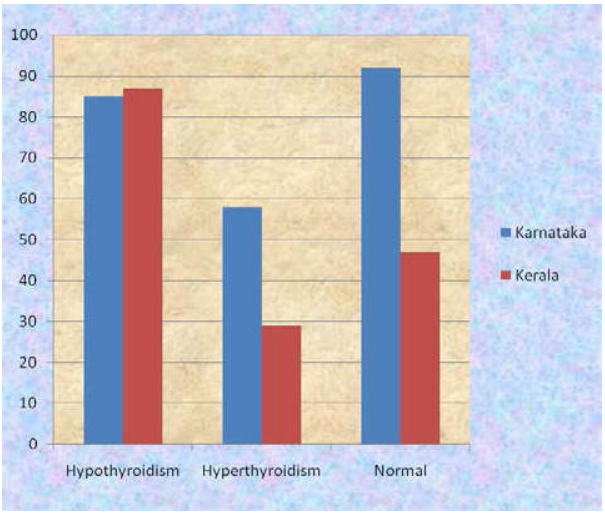

Fig.1 State * Thyroidism Cross tabulation

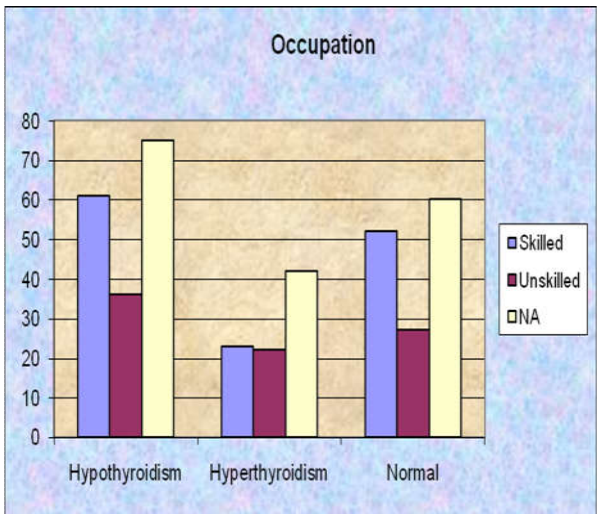

Fig. 2. Occupation-thyroidism

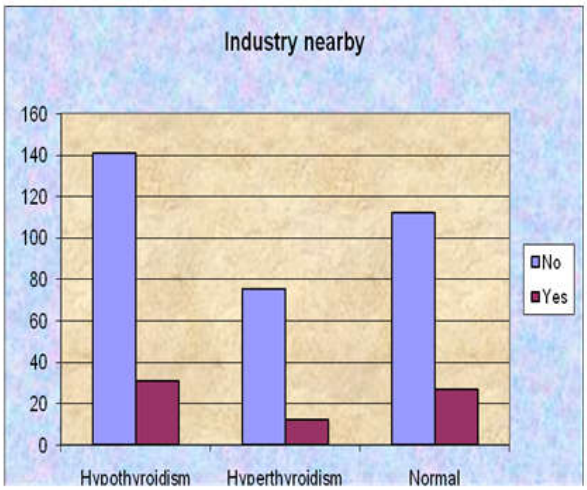

Fig. 3 Industry nearby -thyroidism

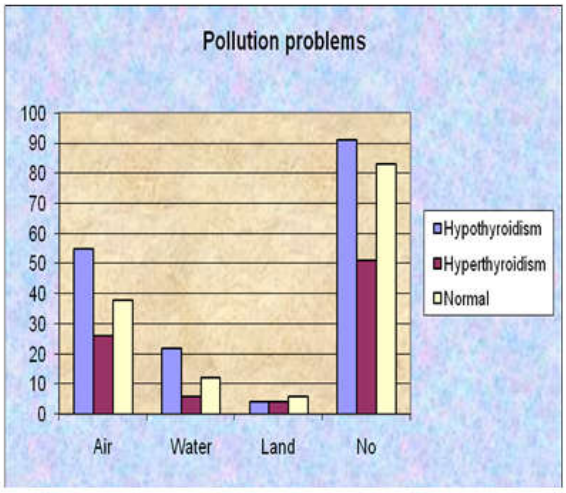

Fig.4. Pollution –thyroidism

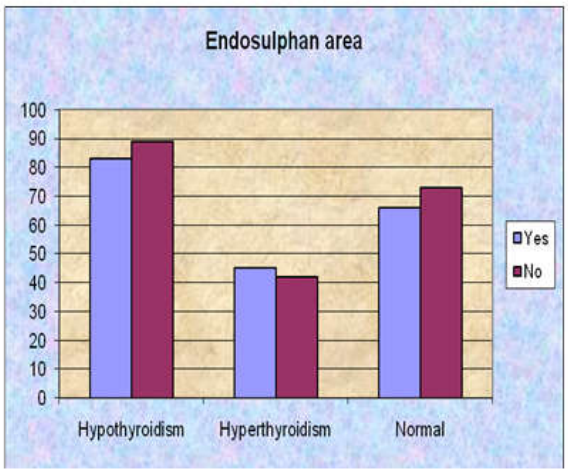

Fig. 5. Endosulphan area- thyroidism

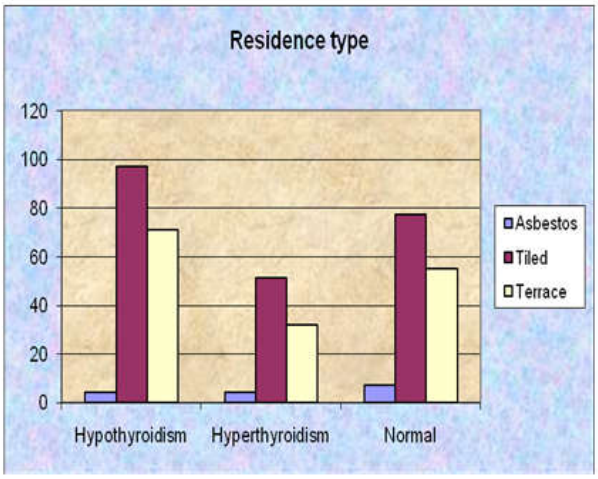

Fig. 6. Residance type-thyroidism

Hypothyroidism is found 44.9% in case of subjects who are skilled workers, 42.3% in people who are unskilled laborers, and 42.4% in subjects who come under not applicable category. Hyperthyroidism is found 16.9% of subjects of subjects who are skilled workers, 25.9% in people who are unskilled laborers, and 23.7% in subjects who come under not applicable category. Normal condition is found in38.2% of subjects who are skilled workers, 31.8% in people who are unskilled laborers, and 33.9% in subjects who come under not applicable category (Fig.2). Hypothyroidism is seen in 44.3% of subjects living nearby industrial establishments, compared to 43.0% in people who do not stay near by any industrial establishments. Hyperthyroidism is seen in 17.1% of subjects living nearby industrial establishments, compared to 22.9% in people who do not stay near by any industrial establishments. Normal subjects were seen 38.6% of subjects living nearby industrial establishments, compared to 34.1% in people who do not stay near by any industrial establishments. (Fig.3). To

find any association between the levels of thyroidism with the vicinity of industrial area of subjects Chi square test is carried out and found that there is no significant association between levels of thyroidism with the vicinity of industrial area of subjects (p=0.014). Hypothyroidism is found 46.2% in case of subjects who live in area of air pollution, 55.0% in people experiencing water pollution, 28.6% in people living in areas of land pollution and 40.4% in people who usually do not face severe pollution of any kind. Hyperthyroidism is found 21.9% in case of subjects who live in area of air pollution, 15.0% in people experiencing water pollution, 28.6% in people living in areas of land pollution and 22.7% in people who usually do not face severe pollution of any kind.

Normal condition is found 31.9% in case of subjects who live in area of air pollution, 30.0% in people experiencing water pollution, 42.8% in people living in areas of land pollution and 36.9% in people who usually do not face severe pollution of any kind (Fig.4). To find any association between the levels of thyroidism with the industrial pollution Chi square test is carried out and found that there is no significant association between levels of thyroidism with the industrial pollution experienced by the subjects. (p=0.66). Leijs *et al.* 2012, reported about thyroid hormone metabolism and environmental chemical exposure. The chemicals such as Polychlorinated dioxins and –furans (PCDD/Fs) and polychlorinated-biphenyls (PCBs) are environmental toxicants that have been proven to influence thyroid metabolism both in animal studies and in human beings. Polychlorinated dibenzo-*p*-dioxins (PCDDs), polychlorinated dibenzo-*p*-furans (PCDFs), polychlorinated biphenyls (PCBs) and polybrominated diphenylethers (PBDEs) can adversely affect thyroid function mainly resulting in hypothyroidism, which is known to cause permanent cognitive deficiencies (Guo *et al.,* 2004; Stewart *et al.,* 2003**;** Walkowiak *et al.,* 2001). To find any association between the levels of thyroidism with the industrial pollution Chi square test is carried out and found that there is no significant association between levels of thyroidism with the industrial pollution experienced by the subjects. Hypothyroidism is seen in 42.8% of subjects who live near Endosulphan affected areas compared to 43.6% in those who do not stay in Endosulphan affected areas. Hyperthyroidism is seen in 23.2% of subjects of subjects who live near Endosulphan affected areas compared to 20.6% in those who do not stay in Endosulphan affected areas. Normal subjects were seen 34.0% of subject of subjects who live near Endosulphan affected areas compared to 35.8% in those who do not stay in Endosulphan affected areas (Fig.5).

To find any association between the levels of thyroidism with the residence near Endosulphan affected areas Chi square test is carried out and found that there is a significant association between levels of thyroidism with the residence near Endosulphan affected areas.(p=0.005). Gerhard. et al.1999 was also reported on endosulfan, an organo chlorine pesticide, is a broad spectrum contact insecticide widely used in pest control. It is used in a wide range of crops including cereals, coffee, cotton, fruit, oil seeds, potato, tea and vegetables. There is a global concern over the acute toxicity of endosulfan. Habibullah and Saiyed, 2003 also reported on endosulfon that, there are several studies that prove that endosulfan is an endocrine disruptant. There are disturbing reports suggesting endocrine effect of pesticides including endosulfan on thyroid glands of animals.

To find any association between the levels of thyroidism with the residence near Endosulphan affected areas Chi square test is carried out and found that there is no significant association between levels of thyroidism with the residence near Endosulphan affected areas. Hypothyroidism is seen in 26.7% of subjects living in asbestos roofed houses compared to 43.1% living in tiled roofed houses, 44.9% in subjects living in terraced houses. Hyperthyroidism is seen in 26.7% of subjects of subjects living in asbestos roofed houses compared to 22.7% living in tiled roofed houses, 20.3% in subjects living in terraced houses. Normal subjects were seen in 46.6% of subjects of subjects living in asbestos roofed houses compared to 34.2% living in tiled roofed houses, 34.8% in subjects living in terraced houses(Fig.6). table To find any association between the levels of thyroidism with the types of roofs of subjects Chi square test is carried out and found that there is no significant association between levels of thyroidism with the types of roofs of subjects.

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