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A STUDY ON PREVALENCE OF GOITRE AMONG SCHOOL CHILDREN AGED 6-14 YEARS IN A RURAL AREA OF KANCHIPURAM DISTRICT, TAMIL NADU

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ABSTRACT

The consequences of iodine deficiency on health are the results of hypothyroidism which includes the implications on reproductive functions and lowering of IQ levels in school aged children. The consequences of iodine deficiency on health are the results of hypothyroidism which includes the implications on reproductive functions and lowering of IQ levels in school aged children. In the current study, a positive association was found between socio economic status of the children and the presence of goiter. The knowledge about the need for maintaining personal hygiene and improving nutritional status of the child should be provided in the schools by the teachers and health education to the mothers should be provided.

Keywords
hypothyroidism, Iodine deficiency disorders, goiter and thyroid gland

Introduction

Iodine is a micronutrient needed in 100 -150 micrograms per day for normal physiological functioning of the body which when deficient leads to iodine deficiency disorders. Iodine deficiency disorders (IDD) is a major public health problem globally affecting 130 countries and 13% of world's population [1].IDD constitute the single largest cause of preventable brain damage worldwide leading to learning disabilities and psychomotor impairment. WHO estimates that 12 percent of the world population is currently affected by goitre [2].

The major complication is impaired development of fetal brain when the mother is iodine deficient. It is the first cause of preventable and irreversible brain damage in children. The consequences of iodine deficiency on health are the results of hypothyroidism which includes the implications on reproductive functions and lowering of IQ levels in school aged children by as much as 13.5 points as compared to children living in iodine-sufficient areas [3].

Goitre is a general term given to the diffuse enlargement of the thyroid gland due to various causes of which iodine deficiency being one of the major causes of goitre. The term “endemic goitre” refers to enlargement of the thyroid gland due to insufficient iodine in the daily diet in a significantly large fraction of a population. According to the guidelines by WHO, a district is said to be endemic when the prevalence of goitre is >10% in the general population and the prevalence of goitre among primary school children aged 6 -12 years is over 5% [4].

According to WHO, the number of countries where iodine deficiency is still a public health problem has halved over the past decade. At least 1500 million people, or 29% of the world’s population, live in areas at risk of iodine deficiency and 54 countries are still iodine-deficient despite the efforts taken over the past decades [5, 6].

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In 1993, WHO and UNICEF recommended Universal Salt Iodization (USI) as the main strategy to achieve elimination of IDD. Since then, there has been a major effort to introduce salt iodization as a safe, cost-effective, and sustainable strategy to ensure sufficient intake of iodine in deficient areas. Worldwide, Iodized salt programs are now implemented in many countries, and two-thirds of the world's population (71%) is currently estimated to be consuming adequately iodized salt [7-10].

IDD constitute a major public health problem in India. Not a single state or union territory in the country is free from the problem of IDD; out of 587 districts in the country, 282 have been surveyed for IDD and 241 are found to be goitre endemic. Of the estimated 200 million people, who were affected by IDD, 71 million have goitre, 2.2 million suffer from cretinism and 6.6 million have neurological deficits [11, 12].
There is an increasing evidence of wide-spread distribution of environmental iodine deficiency not only in the Himalayan region but also in the plains, riverine areas and even the coastal regions. It is now known that one out of every five people in India lives in identified iodine deficient areas and is at the risk of being affected by IDDs due to deficiency of iodine in the soil of the subcontinent and consequently the food derived from it. Due to glaciations, flooding, rivers changing course and deforestation the iodine present in top soil is constantly leached. This in turn leads to deficiency of iodine in crops grown on iodine deficient soil with consequently low iodine in the diet for livestock and humans [13].

Considering the public health importance of IDD in our country, National Goitre Control Program (NGCP) was launched by Government of India in 1962. The program was renamed as National Iodine Deficiency Disorders Control Programme (NIDDCP) in 1992 and USI was identified as the main strategy to eliminate IDD from India. In 1997, iodization of salt was made mandatory in India. Although the ban on the sale of non-iodized salt was lifted in 2000, it was again reinstituted in 2005[14].

According to a survey done by the Health and family welfare department in Tamil Nadu, out of 29 districts, 18 districts have a prevalence of more than 10 %. Of which, Chennai showed a prevalence rate of 10.2% and Kanchipuram district showed a prevalence rate of 7.9% which is above the WHO cut-off level of 5% [15].There are very few studies done in district level to assess the current status of IDD in Tamil Nadu. Hence, this study was done to assess the current level of knowledge, attitudes, practices, and behaviour of the people toward IDD and iodized salt.

MATERIALS AND METHODS

Study area:

Since there is very less studies done to rule out the prevalence of goitre among school children residing in rural areas of Tamil Nadu, the current study was done in the rural field practising area of SreeBalaji Medical College, Sripuram, located at 7 km from Chrompet in Kanchipuram district of Tamil Nadu.

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Study population:

Rao et al., in his study said that the goitre rate in children in the age group of 6 -15years provides a convenient indicator of the status of iodine deficiency in the community as they form the representative study population. Based on the above reference, the current study was done among school children aged 6 -14yrs. Since the migrant population was higher in the age of 15yrs in study area, students aged upto 14yrs was included for the study.

Study design:

The current study is a community based cross sectional study conducted in both the government and private schools of Sripuram,The study subjects included school going boys and girls of age 6-14 years who belonged toSripuram area. (Annexure I)

Sample size:

According to Pandavetal [67] the prevalence of goiter among school children was 13.5%in rural area of Tamil Nadu. This was taken for sample size calculation
P = 13.5%
Q = 100 – P = 86.5%
Inclusion criteria : School children of age 6 -14 years of age in schools of rural field practice area, Sripuram RHTC of SreeBalaji Medical College who consented for the study were included.

Exclusion criteria : Students and parents of the students who were not willing to participate in the study were excluded.
Consent and ethical approval:

Similarly, consent was obtained from the parents of each student through an informed consent form which was given along with the questionnaire prior to data collection.

Pilot study:

Pre-testing was carried out on fifty students for standardizing the questionnaire in Anagaputhur – urban field practice area of SreeBalaji Medical College.

The instrument used:

A structured interview schedule for each student, consisting of 15 questions for the students was conducted. The components for the students' questionnairewere personal interview and clinical examination. The personal interview included the background history (name, age, sex, place of residence) diet history and medical history in detail,menstrual history (in case of adolescent girls) and family history followed by clinical examination.(Annexure IV-A).
The questionnaire for parents had 10 questions which was given through the students and asked their parents to fill and bring it back the next day (Annexure IV-B). It consisted of family profile, socio-economic status, amount and nature of the salt used for cooking, medical history and

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family history of goiter and treatment history of the same. Each of them were given a re-sealablepouch and asked to bring a half a teaspoon of salt from their kitchen which was later tested for iodization levels using RTK.

The iodine content of the salt samples was estimated using standardized iodine testing kits for spot testing, manufactured by MBI kits international, Chennai, India, which are used in the NIDDCP of India and expressed as iodine in parts per million (ppm) .

Clinical examination was conducted by a single examiner (The author) who was trained in the examination of neck for detecting goiter through clinical examination. Personal interviews and anthropometric measurements were done by two assistants, a staff nurse and a house surgeon.The clinical examination for the students consists of Physical Examination.

Measurement of height, weight and calculation of BMI.
Systemic examination of cardio vascular, respiratory, gastro intestinal and central nervous system. Examination of the palpable conjunctiva to look for pallor, examination of the skin and examination of oral cavity for dental caries was also done.
Local examination of the neck(inspection, palpation and auscultation) to look for the presence of goiter.

ASSESSMENT OF SIZE OF THE GLAND

The diagnosis of goiter was made by history and clinical examination for the presence of goiter which was confirmed by palpation of the neck for the presence of nodules. The gland is considered to be enlarged if it is 4 -5 times the normal size, i.e., twice the size of the thumb of the examiner in very young children and if nodules are present, the gland is considered to be goiterous. In case of adolescent children, the gland is considered to be enlarged when there is presence of nodules or when the gland is enlarged thrice the size of the examiner.

To avoid exaggerating the prevalence recorded, doubtful enlarged glands were classified as normal.

EXAMINATION TECHNIQUE: Students were examined in standing position while the examiner sits in front of the child with the head of the child slightly flexed to relax the neck muscles. The thyroid area is examined for any obvious swelling or scan. The full extent of the thyroid area is palpated with both the thumbs simultaneously very gently.

GRADING OF GOITRE: Grading was done according to the WHO criteria for grading of goiter based on the palpation of the gland.

DATA COLLECTION METHOD:

The data was collected by visiting each school a week. The list of students was obtained from the attendance register and the background history was filled in the questionnaire with the help of the class teacher and staff nurse. The house surgeon enquires about the personal history of each student and simultaneously records the anthropometric measurements. Both boys and girls were interviewed and examined separately. Each student was examined for about 3 -4 minutes. The

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same examiner was conducting examination for the students throughout the study so there is no inter – observer bias.

A Portable weighing machine was used to record the weight of the study subjects. The same machine was used throughout the study. Weight was recorded in kilogram. The scale was zeroed before weighing and was calibrated regularly during the study. Inelastic measuring tape was used for measuring the height of the students. The upper limit recorded to nearest single decimal point was taken as the height of the individual. Growth chart was drawn for boys and girls separately using CDC stature-for-age and weight-for-age percentiles for individual students. According to CDC criteria, children who fall below 5th percentile and those who fall above 95th percentile are considered to be abnormal growth (Annexure-V).

OPERATIONAL DEFENITIONS

Goitre: An abnormal increase in the size of the thyroid gland is called goiter.
Iodine deficiency disorders: refers to the group of disorders occurring individually or in combination due to insufficient intake of iodine in the diet leading to conditions such as (a) hypothyroidism (b) retarded physical development and impaired mental function (c) increased rate of spontaneous abortion and still births (d) neurological cretinism including deaf-mutism and myxoedematous cretinism including dwarfismand severe mental retardation.

Iodization of salt: Iodization of salt is defined as the process of fortifying salt for human consumption with iodine and is an effective strategy to increase iodine intake at the population level. Most people need an additional source of iodine as it is found in relatively small amounts in the diet.

Toxic goiter: also called as the Grave's disease is characterized by excessive production of the thyroid hormone resulting in diffuse toxic goiter.

Non-toxic goiter (or) simple goitre: is referred to a simple colloid goiter with normally functioning thyroid gland which occurs as a result of iodine deficiency in children, adolescence and pregnancy in response to increased demand of thyroid hormone during periods of rapid growth.

BMI: Body mass index (BMI) is a measure used to determine childhood overweight and obesity. BMI is calculated by dividing a child's weight in kilograms by the square of height in meters. For children and teens, BMI is age-specific and sex-specific and is referred to as BMI-for- age. A child's weight status is determined using an age - and sex-specific percentile for BMI rather than the BMI categories used for adults.
BMI-for-age weight status categories and the corresponding percentiles were based on expert committee recommendations and are shown in the table-1.
Table 1: BMI for age of the child:

Weight Status Category	**Percentile Range**
Underweight	Less than the 5th percentile

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Normal or Healthy Weight	5th percentile to less than the 85th percentile
Overweight	85th to less than the 95th percentile
Obese	95th percentile or greater

Data collection period : The data was collected for a period of 4 months from February 2014 to May 2014.

DATA ANALYSIS

Data was analyzed using SPSS version 17. Results were expressed in frequencies and Chi-square test was used for association. Correlation between BMI and Age, level of iodization and grade of goiter, family history and level of iodization were seen. P value < 0.05 was considered as statistically significant value.

RESULTS

A total of 670 students were included for the current study. Children were divided into 3 equal groups based on their age. The number of boys (388) were higher compared to the girls.

TABLE 2: BACKGROUND CHARACTERISTICS OF STUDY GROUP

SNO	CHARACTERISTICS (N = 670)	MALE (N =388)		FEMALE (N =282)		TOTAL (N=670)	Total %
		Frequency	%	Frequency	%		
1.	**AGE GROUP**						
a)	6 – 8 years	167	24.9	138	20.6	305	45.5
b)	9 - 11 years	133	19.9	103	15.4	236	35.3
c)	12-14 years	88	13.1	41	6.1	129	19.2
2.	**SOCIOECONOMIC STATUS OF THE STUDENTS (BASED ON REVISED BG PRASAD SCALE- 2014)**						
a)	Upper Class	0	0	0	0	0	0

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b)	Upper Middle Class	5	0.74	6	0.89	11	1.65
c)	Middle Class	252	37.61	128	19.10	380	56.71
d)	Lower Middle class	192	28.65	86	12.83	278	41.49
e)	Lower Class	0	0	1	0.15	1	0.15

Table-2 shows the distribution of background characteristics of both the students and their parents. The age distribution of the students was between 6 to 14 years. The mean age of the children is 9.23(±6 years). Of these, 425(63.4%) of them belonged to the age group of 6 -10 years while 245(36.6%) students belonged to the age group of 11-14 years.

TABLE-3: IODIZATION LEVEL OF SALT SAMPLES

SNO	**CHARACTERISTICS (N = 670)**	**MALE (N =388)**		**FEMALE (N =282)**		**TOTAL (N=670)**	**Total %**
		NO	**%**	**NO**	**%**		
	LEVEL OF IODIZATION OF SALT (USING RTK)						
1)	0 PPM	15	2.23	9	1.34	23	3.43
2)	0.1-6.99 PPM	21	3.13	15	2.23	37	5.52
3)	7-14.99 PPM	172	25.67	140	20.89	312	46.56
4)	15-30 PPM	181	27.01	117	17.46	298	44.47

Table-3&4 shows the menstrual history of the adolescent girls in the study population. Out of the 282 girls, 6 had attained puberty at the age of 13years while 4 of them had attained puberty at the age of 14years. Almost all of them had a regular menstrual cycle and there was no history of amenorrhea among these girls. While 20% of them complained of scanty blood flow during periods, 80% of them had a normal flow.

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TABLE-4: MENSTRUAL HISTORY

S.No	Variable	No (N=10)	Percentage (%)
1.	**Age of puberty**		
a)	<13 years	6	60
b)	>13 years	4	40
2.	**History of amennorhea**		
a)	Present	5	50
b)	Absent	5	50
3.	**Regularity of menstrual cycle**		
a)	Regular cycles	4	40
b)	Irregular cycles	6	60
4.	**Nature of menstrual flow**		
a)	Scanty flow	2	20
b)	Normal flow	8	80
c)	Heavy flow	0	0

Table-5 shows some of the symptoms specific togoitre complained by the students. 5.8% of the students had fatigue, 0.9% of them complained of cold sensitivity, 4.3% had increased weight gain inspiteof normal eating habits and 1.3% of them had bilateral pedal oedema occasionally.

TABLE-5: SYMPTOMS SPECIFIC TO THYROID DYSFUNCTION:

S.NO	CLINICAL FINDINGS	SYMPTOMS	MALE (N= 388)		FEMALE (N= 282)		TOTAL (N= 670)	%
			NO	%	NO	%		

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1.	**GENERAL SYMPTOMS**							
a)	Fatigue	Present	21	3.1	18	2.7	39	5.8
		Absent	367	54.8	264	39.4	631	94.2
b)	Cold sensitivity	Present	3	0.4	3	0.4	6	0.8
		Absent	385	57.5	279	41.6	664	99.1
c)	Weight gain	Present	18	2.7	11	1.6	29	4.3
		Absent	370	55.2	271	40.4	641	95.6
d)	Pedal edema	Present	4	0.6	5	0.7	9	1.3
		Absent	384	57.3	277	41.3	661	98.6

Table-6 shows the nutritional status of the students.Conjunctival pallor was used as an index to evaluate nutritional anaemia among them. A total of 151(22.5%) students were anaemic. The mean height of the boys was 123.20and the mean weight was 26.17. The mean height of girls was 121.69and mean weight was 24.52.21.3% of them were underweight (malnourished) and 59% of the students were classified as normal nourishment.

13% of the students were overweight and 6.7% of them were obese.

TABLE-6: NUTRITIONAL ASSESSMENT OF THE CHILDREN

S.No	**Variable**	**MALE (N = 388)**		**FEMALE (N =282)**		**TOTAL (N=670)**	**Total %**
		NO	**%**	**NO**	**%**		
1.	**CONJUNCTIVAL PALLOR**						
a)	Present	88	13.1	63	9.4	151	22.53
b)	Absent	300	44.8	219	32.7	519	77.46
2.	**BMI OF THE CHILDREN**						
a)	Obese	31	4.6	14	2.1	45	6.71
b)	Over weight	45	6.7	42	6.3	87	12.98

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c)	Normal	234	34.9	161	24	395	58.95
d)	Under weight	78	11.6	65	9.7	143	21.34

Table-7 shows the systemic examination findings of the students. 99.7% of them had normal cardiovascular findings, while 0.3% had palpitations even at rest. 89.7% of them had normal breath sounds, 8.8% had respiratory tract infection at the time of examination. 1.34% of the students had added breath sounds of other causes. 98.4% of the students had normal gastro intestinal functions and 1.6% of them had splenomegaly and abdominal tenderness.

86.1% of the children did not have any finding specific to central nervous system. 5.7% complained of lethargy and depression, 4.2% complained of poor concentration, 2.7% had memory loss and 1.3% complained of irritability.

TABLE-7: SYSTEMIC EXAMINATION OF THE STUDY GROUP

S.NO	**CLINICAL FINDINGS**	**MALE (N =388)**		**FEMALE (N =282)**		**TOTAL**
		NO	**%**	**NO**	**%**	
1.	**CARDIO- VASCULAR SYSTEM**					
a)	Normal Heart Sounds	387	57.8	281	41.9	668
b)	Palpitation	1	0.14	1	0.14	2
2.	**RESPIRATORY SYSTEM**					
a)	Normal Breath Sounds	346	51.6	255	38.1	601
b)	Upper Respiratory Infection	13	1.9	15	2.2	28
c)	Lower Respiratory Infection	21	3.1	10	1.5	31
d)	Wheeze Present	6	0.9	1	0.1	7
e)	Crepitations Present	1	0.1	1	0.1	2
f)	Dyspnoea On Exertion Present	1	0.14	0	0	1
3.	**GASTRO -INTESTINAL SYMPTOMS**					
a)	Normal Bowel Sounds	382	57.0	277	41.3	659

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b)	Splenomagaly	5	0.7	5	0.7	10
c)	Abdominal tenderness	1	0.1	0	0	1
4.	**CENTRAL NERVOUS SYSTEM**					
a)	Normal Neurological Function	333	49.7	244	36.4	577
b)	Memory loss	8	1.2	10	1.5	18
c)	Poor concentration	16	2.4	12	1.8	28
d)	Lethargy/ depression	26	3.9	12	1.8	38
e)	Irritability	5	0.7	4	0.6	9

Table-8 shows the clinical examination findings of the skin and oral cavity. 98.21% did not have any skin problems, 2.69% had bacterial skin infection and 1.64% had severe head louse infestation. 1.8% complained of dry skin. 3.6% had dental caries 1.94% had angular stomatitis and sore tongue while 1.79% had oral ulcer.

TABLE-8: SKIN AND ORAL CAVITY EXAMINATION OF THE STUDY GROUP

S.NO	**CLINICAL FINDINGS**	**MALE (N =388)**		**FEMALE (N =282)**		**TOTAL**	**%**
		NO	**%**	**NO**	**%**		
1.	**SKIN**						
a)	Normal skin	362	57.5	267	42.4	629	99.9
b)	Dry skin	6	0.9	6	0.9	12	1.8
c)	**Infection/ infestation** - Scabies - Pyoderma Head louse infestation	7 4 4	1.04 0.6 0.6	3 4 7	0.48 0.6 1.04	10 8 11	 1.52 1.2 1.64
2.	**ORAL CAVITY EXAMINATION**						
a)	Normal Oral Cavity	363	54.17	258	38.50	621	92.67
b)	Dental Caries Present	14	2.09	10	1.49	24	3.58

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c)	Angular stomatitis	6	0.9	7	1.04	13	1.94
d)	Oral ulcer	5	0.75	7	1.04	12	1.79

Table-9 showed the local examination findings of the neck of the study population. Of the total 670 students examined, 1% of the female students and 0.9% of male students had visible goitre. 3.3% of the boys and 2.5% (a total of 5.8%) of the girls had a palpable goitre. Of these, 4.81% was diffuse swelling of goitre, while 1.19% was nodular enlargement of goitre.

Figure 1: frequency distribution of goitre with age and sex of the child

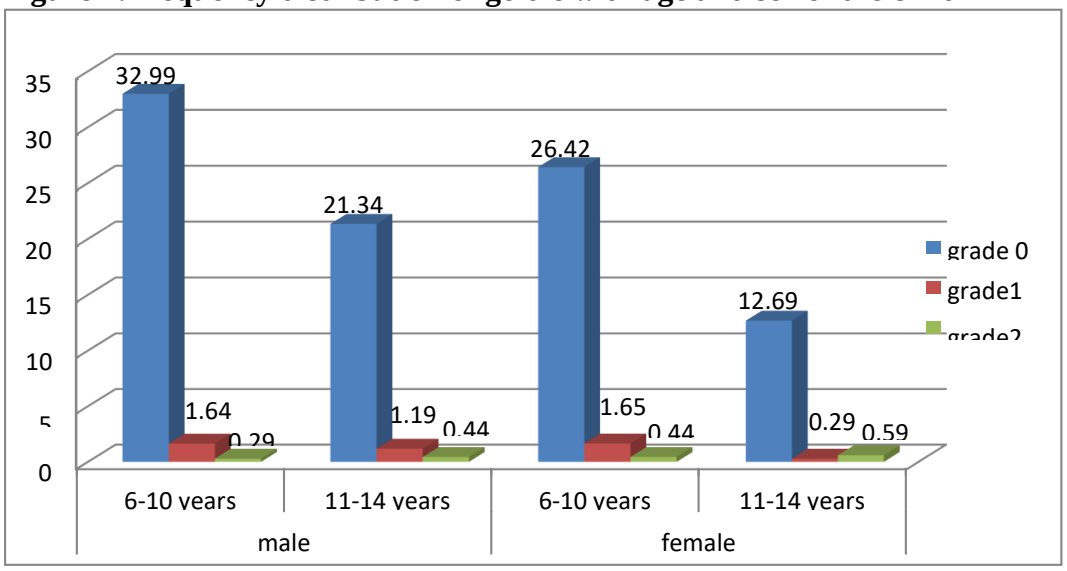
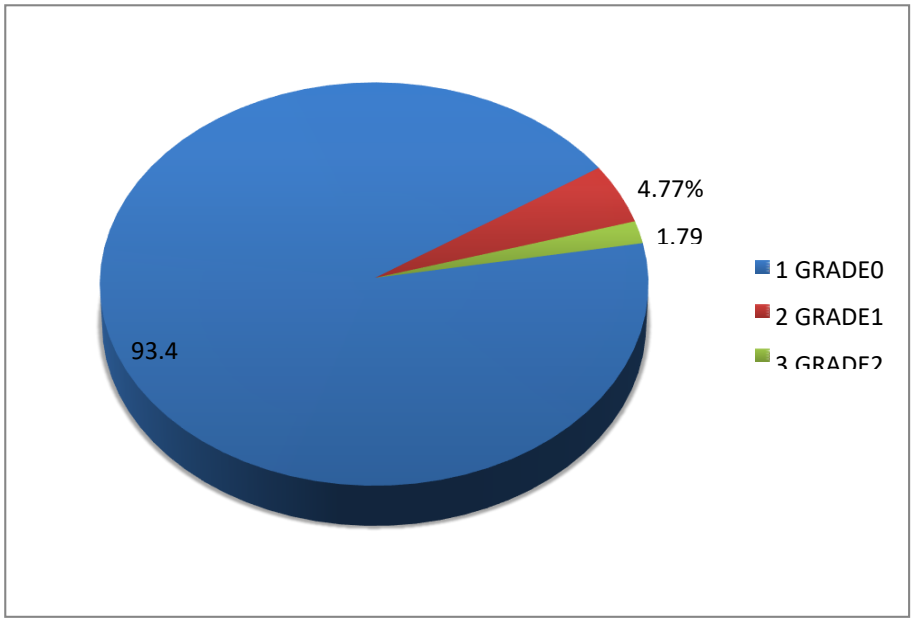


Figure 2: Prevalence of goitre among the study population



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To evaluate the credibility of the study, association between the presence of goitre and selected variables were formulated as follows. Chi-square is used to test the significance of the study. The level of significance is evaluated using p-value, odds ration with its confidence interval. For the estimation of association between goitre and various factors, the children were divided into two age groups, <10 years (6 -10yrs) and >10 years (11 -14 yrs).

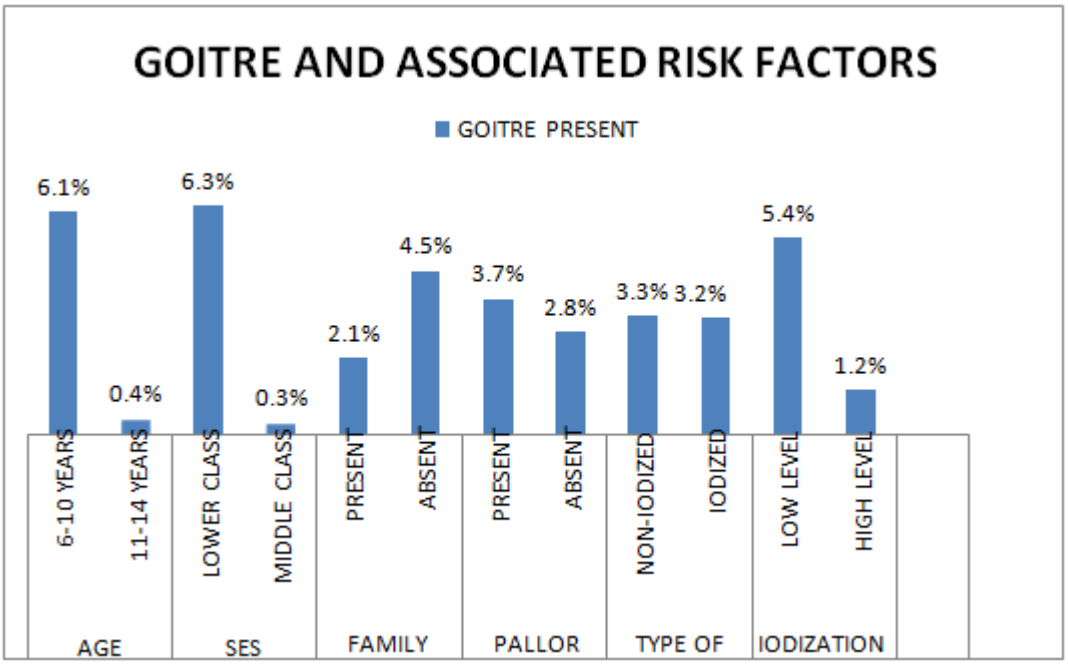

FIGURE 3: Association between prevalence of goitre and various risk factors.

Figure 3 described the association between the prevalence of goitre present (6.56%) and its significant association with various risk factors.

Table –10 shows the association between nutritional status of the child and goitre. A significant association (OR-5.22and 95% CI - 2.78 – 9.78) was found between the presence of goitre and the presence of conjuctival pallor among the students (p-value - 0.0001)

TABLE - 10: ASSOCIATION BETWEEN OTHER RISK FACTORS AND GOITRE

S.NO	CHARACTERISTICS	N=670	GOITRE		Chi square	P VALUE
			no	%		
1.	PROCUREMENT OF SALT					
a.	Petty Shops	286	14	2.09	3.873	0.276
b.	Ration Shop	182	12	1.79		

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c.	General Store	193	18	2.69		
2.	STORAGE OF SALT					
a.	Open Container	342	19	2.84	1.165	0.282
b.	Closed Container	328	25	3.73		
		342	19	2.84		
3.	BMI OF THE CHILDREN					
a)	Obese	45	4	4	0.878	0.362
b)	Over weight	87	7	7		
c)	Normal	395	24	24		
d)	Under nourished	143	9	9		

Association between storage of salt and BMI of the children with goitre grading was done. But it did not show any statistical association.

DISCUSSION

Iodine deficiency leads to many disorders which are collectively known as iodine deficiency disorders. To assess the iodine deficiency disorders in a region, school children of age 6 -12 years are considered as true representatives of community and are sampled to investigate the iodine status in general population as they are more vulnerable and easily accessible through schools.[16]

Globally, 2.2 billion people live in areas with iodine deficiencies, with the risks of resulting complications, while in India; 167 million people are at risk of IDD, 54.4 million people have goitre, and 8.8 million people have IDD-related mental / motor handicaps [17].

While a recent study done by Pandav et al., in Tamil Nadu showed a total goiter rate of 13.5% conducted in the state of Tamil Nadu [18].The total goiter rate in boys and girls was 12% and 15% respectively.

Another study conducted by Zama et al among school children aged 6 -12 years, in Chamarajanagar District, Karnataka was in accordance with the current study which showed a total goitre prevalence of 7.74%[19].

It is evident from this finding that the prevalence of goitre was higher among the boys (3.58%). This finding is consistent with the study done by Khan et al., where the prevalence of goitre among the boys was 21.2% compared to 16.7% among the girls [20].

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The predominance of goitre among the boys in this study may be due to the fact that the proportion of boys was
igher in the study population (57.9%), compared to the girls (42.1%). observed among students in pre-adolescent (11-14 years) age. In a study done by Kamnath et al., to measure the prevalence of goitre among school children in Rural area of Belgaum district showed similar results where a high prevalence (26%) of goitre was found among adolescent age (10-19) group children [15].
In the current study, a positive association was found between socio economic status of the children and the presence of goiter. A higher prevalence of goiter was found among the children who belonged to lower socio economic status (p-value < 0.0001). Similarly, Knudsen et al., in his study article on showed that improving the socio economic status of the population has an improvement on reducing the prevalence of endemic goiter [8,12].

Goitre and pallor:

A positive association was found between anaemia and occurrence of goitre (p-value 0.0004). This shows that children with nutritional deficiency are more prone for iodine deficiency as well and hence the prevalence of goitre was higher with children having anaemia. A similar study done by Sharma et al., showed that a higher prevalence of goitre was seen among children with pallor [7,11].
Similar results were seen in other studies: National Family Health Survey-3, report showed that 51% population of the country was using adequately iodized salt (>15 ppm) [21]. Raveesh et al., in his study done in Kashmir showed that salt samples collected from retail shops 32.82% of samples were non-iodised, 22.56% samples were inadequately iodised and only 44.62% of samples were adequately iodised.
The prevalence of goitre was higher (5.38%) among those children who were consuming inadequately iodized salt (<15 ppm) and the difference is statistically significant (p- value <0.0001). About 1.2% of the children who were consuming adequately iodised salt (>15ppm) also had goitre.

CONCLUSION

The present study showed that the overall prevalence of goitre is 6.56% (grade 1 = 4.77 % and grade 2 = 1. 79%) in Kanchipuram district indicating that it is still an endemic area, according to the criterion of goitreendemicity by World health organisation revealing that it is still being a public health problem in our country. More effort is, therefore, needed to bring down the prevalence of goitre to below 5% to make the district non endemic
Factors such as age of the child, nutritional pallor, socioeconomic status, level of iodization of salt consumed at households and adequacy of iodization of salt consumed had significant effect on occurrence of goitre. Whereas, sex of the child, BMI, procurement of salt and storage of salt at houses did not have an influence on the presence of goitre among the children.
Nearly 3.7% of the study population were using non - iodized salt for cooking revealing that though there is a ban for selling non-iodized salt in the country, it is still not fully implemented.
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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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