



ISSN NO. 2320-5407

Journal Homepage: -www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/14436
DOI URL: <http://dx.doi.org/10.21474/IJAR01/14436>



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ADVANCED RESEARCH (IJAR)
ISSN 2320-5407
Journal Homepage: <http://www.journalijar.com>
Article DOI:10.21474/IJAR01/14436

RESEARCH ARTICLE

STUDY OF PREVALENCE AND AWARENESS REGARDING THYROID DISORDERS IN PEOPLE OF WESTERN NEPAL AT ZENUS HOSPITAL

Dr. Sharda Singh¹, Dr. Mohan Singh², Dr. Lokendra Deo Bhatta³, Ms. Sujata G.M⁴ and Mr. Bikash Pandey⁵

1. Research Department, Zenus Hospital and Research Centre Pvt. Ltd.
2. Orthopaedic Department, Zenus Hospital and Research Centre Pvt. Ltd.
3. Medicine Department, Zenus Hospital and Research Centre Pvt. Ltd.
4. Research Department, Zenus Hospital and Research Centre Pvt. Ltd.
5. Pathology Department, Zenus Hospital and Research Centre Pvt. Ltd.

Manuscript Info

Manuscript History

Received: 22 January 2022

Final Accepted: 24 February 2022

Published: March 2022

Key words:-

Thyroid Disorders, Prevalence, Sub
Clinical Hypothyroidism, Awareness

Abstract

Background: Thyroid dysfunction indicates alteration of Thyroid Stimulating Hormone with normal or abnormal free triiodothyronine and free thyroxine hormone. Thyroid disorder may range from small goiter to life threatening diseases such as thyroid cancer when there is imbalance in regulation in thyroid hormones.

Methods: This prospective observational study was conducted among 221 participants with the age more than 18 years old. Thyroid function tests (free triiodothyronine, free thyroxine, Thyroid stimulating hormone) was done to identify thyroid disorders. Thyroid dysfunction was categorized as euthyroid, subclinical hypothyroidism, hypothyroidism, subclinical hyperthyroidism and hyperthyroidism on the basis of the level of thyroid hormones. Data collection for demography, knowledge about thyroid gland and its disorder was done by means of a self-designed questionnaire. Data were entered and analyzed on Statistical Package for the Social Sciences (SPSS-16).

Results: Among 221 subjects, over all prevalence of thyroid disorder was found 55 (24.88%). Of which subclinical hypothyroidism 39 (17.6%) and subclinical hyperthyroidism 9 (4.1%), hyperthyroidism 4 (1.8%), hypothyroidism 3 (1.4%) and euthyroidism 166 (75.11%). Subclinical conditions were found more common as compared to hypo or hyperthyroidism. Females were observed with higher thyroid prevalence. Regarding knowledge about thyroid, 64 (29.0%) had poor knowledge, 119 (53.8%) had average knowledge, 37 (16.7%) had good knowledge whereas 1 (0.5%) had excellent knowledge.

Conclusions: Our study revealed the prevalence of thyroid disorders in which the sub clinical hypothyroidism was most prevalent. Thyroid dysfunction was observed more common in females as compared to males. Sub clinical hypothyroidism was found higher in 18-33 age groups. Overall participants were observed having average knowledge of thyroid disorders.

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Corresponding Author:- Dr. Sharda Singh

Address:- Research Department, Zenus Hospital and Research Centre Pvt. Ltd.

Introduction:-

Thyroid dysfunction indicates alteration of Thyroid Stimulating Hormone (TSH) with normal or abnormal free triiodothyronine (fT3) and (free thyroxine) fT4 hormone.¹ Globally, thyroid diseases are one of the commonly occurring endocrine disorders.²

It is estimated that about 300 million people worldwide are affected by thyroid disorder and over half of the population assumed to be unaware about their condition.³ It is a major health problem of Nepal which covers 30% of the population affected alone in the eastern region of Nepal.⁴ Thyroid disorder may range from small goiter to life threatening diseases such as thyroid cancer. Both hypo and hyperthyroidism can affect cardiac contractility, vascular resistance and which can further cause heart failure, fibrillation.⁵

There are limited studies on the prevalence and awareness regarding thyroid disorder in western Nepal. Lack of knowledge regarding thyroid gland and its disorders will lead patients to neglect disease condition.⁶ Therefore; the study was designed with an objective to assess the prevalence and knowledge of thyroid dysfunction in the western region of Nepal.

Methods:-

This prospective observational study was conducted with 221 subjects in the medicine department using convenience sampling with age above 18 years who visited Zenus Hospital and Research Centre from Nov 25, 2019 to Apr 1, 2021. The sample size was calculated by using the formula $N = Z^2 pq / e^2$ (where; $z = 1.96$, $p = \text{prevalence}$ 17.42%, $q = 1 - p$, $e = 5\%$ level of significance). Ethical approval was taken from Nepal Health Research Council, Kathmandu. Respondents who agreed to sign informed consent and willed to take part in the study were included in the study. The subject was assured for the anonymity and confidentiality of the information. Medical person, females taking OCP, people undergone thyroid surgery, people taking antiepileptic, antibiotics, hormonal therapy were excluded in the study. A self designed questionnaire was used to collect information on the different variables related to socio-demographics and knowledge of thyroid disorder.

Venous blood sample 2-3 ml was collected in gel tube, and was allowed to clot at room temperature, then serum was separated by centrifugation at 3000 RPM for 15 minutes for thyroid hormones assay. The thyroid hormones (fT3, fT4 and TSH) were analyzed by FIA (Fluorescence immunoassay) method. The reference interval for fT3 was 1.3-3.1 nmol/L, fT4 was 66-181 nmol/L and TSH was 0.3-4.2 mIU/L respectively. Thyroid dysfunction was categorized according to guidelines (Harrison's Principles of Internal Medicine and Subclinical thyroid disease: scientific review and guidelines) to identify thyroid dysfunction.

The presence of either subclinical or clinical derangements of thyroid hormones was defined as thyroid disorder. Thyroid function including all three hormones i.e fT3, fT4 and TSH in normal reference intervals is considered as euthyroidism. Similarly, abnormal thyroid parameters were further categorized as hyperthyroidism for those with decreased level of TSH and elevated level of fT3 and fT4, hypothyroidism (increased TSH and decreased fT4), sub clinical hypothyroidism (increased TSH, normal fT4), subclinical hyperthyroidism (low TSH and normal fT3 and fT4).

The collected data were entered and analyzed by Statistical package for Social Science (SPSS) version 16.0. Descriptive statistics was applied. Data were presented as frequency and percentage.

Results:-

Table 1 shows the demographic characteristics of respondents among 221 respondents 155 (70.1%) females and 66 (29.9%) males were observed. Highest number of respondents were observed in 18-33 age groups 92 (41.6%) and lowest number of respondents were found in above 65 age groups 15 (6.8%). Majority of respondents were found belonging to Brahmin/Chhetri 143 (64.7%) followed by indigenous tribe 59 (26.7%). Out of total participants 79 (35.7%) had primary, 73 (33%) secondary and 37 (16.7%) tertiary level education whereas 32 (14.5%) were found illiterate.

More than 50% of participants were found involved in service 56 (25.3%) and agriculture 55 (24.9%) whereas 10 (4.5%) respondents seen not involved in any occupation. Most of the participants 140 (63.3%) were found in the group who never consumed alcohol whereas 3 (1.4%) found taking alcohol regularly and 78 (35.29%) were seen

having alcohol irregularly / occasionally. Only 28 (12.7%) participants were observed who had the habit of taking tobacco and cigarette.

Table 1:- Demographic profile of respondents (n=221).

Variables	Category	Frequency (n)	Percentage (%)
Age of respondents	18-33	92	41.6
	34-49	79	35.7
	50-65	35	15.8
	>65	15	6.8
Gender	Male	66	29.9
	Female	155	70.1
Ethnicity of respondents	Brahmin/chhettri	143	64.7
	Indegenous tribe	59	26.7
	Dalit	17	7.7
	Muslim	2	0.9
Educational status	Illiterate	32	14.5
	Primary	79	35.7
	Secondary	73	33.0
	Tertiary	37	16.7
Occupational status	Agriculture	55	24.9
	Business	47	21.3
	Service	56	25.3
	House wife	53	24.0
	No any	10	4.5
Alcohol consumption	Regular	3	1.4
	Irregular	35	15.8
	Occassional	43	19.5
	Never	140	63.3
Tobacco and cigarette Consumption	Yes	28	12.7
	No	63	28.5
	Never	130	58.8

Figure 1 Pie chart mentioned below shows the thyroid status of the total 221 respondents who enrolled in the study. The overall prevalence of thyroid dysfunction among study population was observed 55 (24.88%). Out of total thyroid dysfunction cases, subclinical hypothyroidism was found 39 (17.6%), hypothyroidism 3 (1.36%), subclinical hyperthyroidism 9 (4.1%), Hyperthyroidism 4 (1.8%) and euthyroidism 166 (75.11%) respectively. Hence, Sub clinical hypothyroidism was revealed to be most prevalent thyroid disorder.

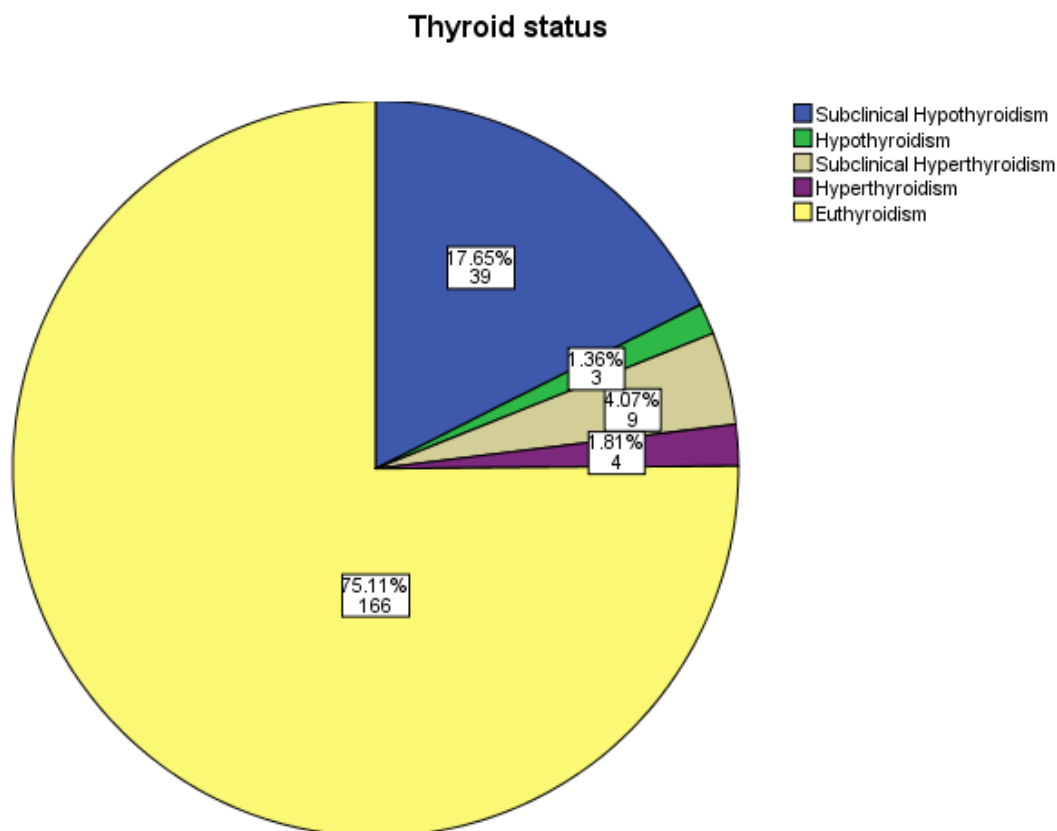


Table 2 shows the distribution of thyroid disorders with different variables. Out of total 221 participants, 55 subjects with thyroid dysfunction, 41 (74.54%) females and 14 (25.45%) males were observed. Thyroid dysfunctions i.e. sub clinical hypothyroidism were observed higher in females 29 (52.72%) than males 10 (18.18%) followed by subclinical hyperthyroidism females 6 (10.90%) and males 3 (5.45%), hyperthyroidism 4 (7.27) in females, hypothyroidism females 2 (3.63) and males 1 (1.81%) whereas no any cases for male respondents were found in hyperthyroidism.

Among total thyroid dysfunctions, sub clinical hypothyroidism was found more prevalent in 18-33 age group 18 (32.72%) followed by 34-49 age group 11 (20%), 7 (12.72%) in 50-65 and 3 (5.45%) in above 65 age groups. There were found equal number of hypothyroid respondents in all age groups and no cases were seen in 50-65 and above 65 age groups hyperthyroid groups. In euthyroid subjects, maximum numbers of respondents were observed in 18-33 age groups (40.96%) class.

In the present study among total 55 cases of thyroid dysfunction overweight was observed in 25 (45.45%) individuals. Out of 25 overweight participants, 18 (72%) participants were found having subclinical hypothyroidism. And, no cases were observed in underweight class. In total 166 euthyroid subjects, highest numbers of subjects were observed in normal body weight 65 (39.15%) class.

Among total thyroid disorder hypertension was found in 9 cases (16.36%) out of which 7 (77.77%) were affected by sub clinical hypothyroidism and 1 (11.11%) by hyperthyroidism in our study. In euthyroid subjects, normal blood pressure was found in sub clinical hypothyroidism 141 (84.93%).

In present study thyroid disorders were observed in 15 (27.27%) respondents who had had the habit of drinking alcohol on regular, irregular or occasional basis. Among which 6 (40%) respondents were seen consuming alcohol occasionally. Out of total euthyroids 100 (60.24%) respondents who never consumed alcohol were observed.

Table 2:- Distribution of thyroid disorders with different variables; age, gender, BMI, Blood pressure and alcohol consumption (n=221).

S.N	Questions	Frequency of Correct Response	Percentage (%)
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Variables	Category	Sub clinical hypothyroidis m	Hypothyroidis m N (%)	Sub clinical hyperthyroidis m	Hyper thyroidis m	Euthyroidis m
Gender	Male	10 (18.18)	1 (1.81)	3 (5.45)	0	52 (31.32)
	Female	29 (52.72)	2 (3.63)	6 (10.90)	4 (7.27)	114 (68.67)
Age	18-33	18 (32.72)	1 (1.81)	3 (5.45)	2 (3.63)	68 (40.96)
	34-49	11 (20)	1 (1.81)	3 (5.45)	2 (3.63)	62 (37.34)
	50-65	7 (12.72)	0	2 (3.63)	0	26 (15.66)
	>65	3 (5.45)	1 (1.81)	1 (1.81)	0	10 (6.02)
BMI	Under weight	0	0	0	0	7 (4.21)
	Normal weight	19 (34.54)	0	3 (5.45)	0	65 (39.15)
	Over weight	18 (32.72)	3 (5.45)	2 (3.63)	2 (3.63)	57 (34.33)
	Obese	2 (3.63)	0	4 (7.27)	2 (3.63)	37 (22.28)
BP	Normal	32 (58.18)	2 (3.63)	9 (16.36%)	3 (5.45)	141 (84.93)
	Low	0	0	0	0	8 (4.81)
	High	7 (12.72)	1 (1.81)	0	1 (1.81)	17 (10.24)
Alcohol Consumption	Regular	0	0	1 (1.81)	0	2 (1.20)
	Irregular	4 (7.27)	0	1 (1.81)	0	30 (18.07)
	Occasional	6 (10.90)	1 (1.81)	1 (1.81)	1 (1.81)	34 (20.48)
	Never	29 (52.72)	2 (3.63)	6 (10.90)	3 (5.45)	100 (60.24)
	Total	39	3	9	4	166

Table 3 represents the knowledge and awareness on thyroid disorders. Our study revealed that highest correct response 201 (91%) was observed in question-"regarding diagnostic method of thyroid dysfunction" minimum correct respondents 27 (12.2%) were observed in question regarding complications of hyperthyroidism. 156 (70.6%) had given the correct response "meaning of thyroid" comparable to the cross sectional study conducted in Maharaja Agrasen Hospital, New Delhi and among total 200 patients, 60 % of patients knew that thyroid is a gland situated in the neck and 50 % of patients knew about hypothyroidism and hyperthyroidism.⁷

Table 3:- Knowledge and awareness regarding thyroid disorders (n=221).

1.	What is thyroid?	156	70.6
2	The function of thyroid gland in human body is	27	12.2
3.	What are the two main hormones secreted by thyroid gland?	78	35.3
4.	Which gland mainly controls and regulates the thyroid activity?	84	38
5.	Increase secretion of thyroid hormone in the body causes	77	34.8
6.	Decrease secretion in thyroid hormone in the body causes	82	37.1
7.	Iodine deficiency, autoimmune disease and inflammation of thyroid are responsible for	110	49.8
8.	Weight gain, joint aches and slowed heart rate are the symptoms of	35	15.8
9.	Which of the following is the symptom of hyperthyroidism	53	24
10.	Exophthalmus, one of the symptom of hyperthyroidism means	33	14.9
11.	Hypothyroidism can affect women of reproductive age group by	105	47.5
12.	The most suitable set of risk factors for thyroid disorder consist of	62	28.1
13.	Average amount of iodine recommended for adult per day	70	31.7
14.	Name a disease caused due to the deficiency of iodine	110	49.8
15.	Why is iodine important in pregnancy?	92	41.6
16.	At which week of pregnancy does thyroid gland in the fetus develops?	60	30.8
17.	Body's endocrine gland, which develops first in the fetus is	45	20.4
18.	Excessive consumption of iodine causes	55	24.9
19.	Which type of thyroid disorder is more prevalent globally?	39	17.6
20.	What could be the complication of hyperthyroidism?	27	12.2
21.	What does T.E.D stand for?	33	14.9
22.	Which sex is mostly affected by thyroid disease?	117	52.9
23.	Thyroid functions is diagnosed through	201	91
24.	Thyroid disorders can be treated with	47	21.3
25.	State the best foods for your healthy thyroid	114	51.6

Table 4 shows the frequency and percentage of score received by the participants. In our study majority of respondents 119 (53.8%) had average knowledge on thyroid disease dysfunction whereas 64 (29%) respondents had poor knowledge. Similarly, 37 (16.7%) had good knowledge and 1 (5%) was found with excellent knowledge.

Table 4:- Knowledge score of the participants (n=221).

Knowledge on thyroid disorder	Frequency (n)	Percentage (%)
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Poor	64	29.0
Average	119	53.8
Good	37	16.7
Excellent	1	0.5

Discussion:-

The outcomes of this prospective observational study assessed the information on the populations who visited Zenus Hospital and Research Centre, socio-demographic characteristics of the subjects, prevalence, knowledge and awareness on thyroid disorder.

In the present study comprised 221 respondents among them 155 (70%) were female whereas 66 (29.9%) male respondents were found. This study shows overall 55 (24.88%) thyroid dysfunction among people of western Nepal who visited Zenus Hospital and Research Centre. Similarly, the prevalence of thyroid disorders in previous studies reported 29% in central Kathmandu Nepal,⁸ 25% in Kavre,⁹ and 17.42% in Pokhara Nepal.¹⁰

In our study, out of total thyroid dysfunction cases, subclinical hypothyroidism was found 39 (17.6%), hypothyroidism 3 (1.36%), subclinical hyperthyroidism 9 (4.1%), and hyperthyroidism 4 (1.8%) respectively. Similar study from Deokar PG et al. showed 22.16% subjects having thyroid dysfunction in the study population among which 9.44% were subclinical hypothyroid, 4.24% were overt hypothyroid, 2.5% overt hyperthyroid and 5.97% were found to be subclinical hyperthyroid. The hypothyroidism was commonly seen than hyperthyroidism.¹¹ whereas the study conducted in Dhulikhel hospital Kathmandu University 25% thyroid dysfunction was observed, of which hypothyroidism (8%) and subclinical hypothyroidism (8%) had higher prevalence compared to subclinical hyperthyroidism (6%) and hyperthyroidism (3%).⁹

Among the total cases with thyroid disorders females 41 (74.54%) were seen more affected in comparison to males 14 (25.45%). Other studies conducted in Kerala state, India observed 67% females and a hospital based retrospective study of hilly Nepal found 80.8% of females which supports our study.^{12,13}

In regard to age wise prevalence of thyroid disorders, our study observed majority 18 (32.72%) of sub clinical hypothyroidism cases were under 18-33 age group while least number 3 (5.45%) was seen in above 65 age groups. Similar findings were observed in the study of Central Referral Hospital, Sikkim found that maximum number of participants were observed in subclinical hypothyroidism between the age group of 21-30 years (29%) followed by 31-40 yrs of age group (25.7%) whereas lowest was observed above 70 (3%) years of age.¹⁴ Also, two studies carried out in Srinagar, Jammu & Kashmir state of India¹⁵ and women of Rupandehi, Nepal¹⁶ is consistent with our study findings.

In the present study the prevalence of hypothyroidism was observed lowest among all the categories of thyroid disorder and the study similar with adult south Indian population¹⁷ where hypothyroidism was found to be 3.9% in a population based study and 3.6% in a previous study done in hilly Nepal.¹³

In the present study among total 55 cases of thyroid dysfunction overweight was observed in 25 (45.45%) individuals. Out of 25 overweight participants, 18 (72%) participants were found having subclinical hypothyroidism. The finding was found similar to the metaanalysis reported the positive association of hypothyroidism and subclinical hypothyroidism with obese population but no association between obesity and hyperthyroidism¹⁸ where as in our study subclinical hyperthyroid 4 (7.27%) was found prominently related to obesity, followed by hypothyroidism 2 (3.63%) and hyperthyroidism 2 (3.63%) where no difference was seen. The two studies were found in contrast to our finding which showed no relation between BMI and thyroid function in euthyroid individuals or patients with subclinical hypothyroidism.^{19,20}

Among total thyroid disorder hypertension was found in 9 cases (16.36%) out of which 7 (77.77%) were affected by sub clinical hypothyroidism and 1 (11.11%) by hyperthyroidism in our study but a community based cross-sectional

study among 4087 subjects in West Pomerania, the northeast area of Germany; concluded that subclinical hyperthyroidism is not associated with hypertension which was different from our findings.²¹

In present study thyroid disorders were observed in 15 (27.27%) respondents who had had the habit of drinking alcohol on regular, irregular or occasional basis. Among which 6 (40%) respondents were seen consuming alcohol occasionally, diagnosed with sub clinical hypothyroidism. A study conducted using data from the Nurses' Health study II observed no association between alcohol and hyperthyroidism²² while a population based case control study in Denmark found moderate alcohol consumption reduced the risk of overt autoimmune hypothyroidism.²³

In our study, we assessed the respondent knowledge by scoring categories i.e. Poor (1-25%), Average (26-50%), Good (51-75%) and Excellent (76-100%) to the participants. We had 25 thyroid related questionnaires and 4 marks given to each question. From our study it was observed that majority of respondents 119 (53.8%) had average knowledge on thyroid gland and its dysfunction whereas 64 (29%) respondents had poor knowledge. 37 (16.7%) had good knowledge and 1 (0.5%) was found with excellent knowledge. Our result was similar to a study conducted among 367 adult residents of Saudi Arabia observed that 140 (57.32%) of respondents with good knowledge, whereas 188 of them (42.68%) had poor knowledge of thyroid disorder²⁴ and a study carried out in Tabuk city, 52% of respondents had good knowledge, while 45% had poor knowledge about the thyroid gland and its disorders.²⁵

The study has acknowledged some of the limitations. The study was conducted in small sample size and in limited area of western Nepal so it cannot represent general population. This is a qualitative study and reliability of the data depends upon honesty of respondents.

Conclusion:-

Our study revealed the prevalence of thyroid disorders in which the sub clinical hypothyroidism was seen most prevalent. Thyroid dysfunction was observed more common in females as compared to males. Sub clinical hypothyroidism was found highest in 18-33 age groups. Overall participants were observed having average knowledge on thyroid disorders. Further research studies with large sample size will provide more reliable data of prevalence regarding thyroid disorder. Educational programs and campaigns should be conducted for enhancement of the knowledge and awareness on thyroid gland and its disorders advantageous for earlier detection of undiagnosed cases of thyroid and its prevention as well as control.

Acknowledgements:-

The author's kindly acknowledge Zenus Hospital and Research Centre Pvt. Ltd. for financial support to carry out the study. We are grateful to the members of the research team and participants for their co-operation and contribution to this study.

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of article.

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