

# Knowledge, Attitude, and Practice of Reproductive Aged Bangladeshi Adult Females with Hypothyroidism

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## Introduction

Hypothyroidism and its milder form subclinical hypothyroidism (SCH) are common endocrine disorders, especially in females. Apart from metabolic functions, the thyroid hormone plays important role in female reproduction. Hypothyroidism may lead to menstrual irregularity, anovulation, ovarian cysts, and

subfertility.<sup>1</sup> Untreated hypothyroidism and SCH both are also clearly associated with increased maternal (preeclampsia, placental abortion, postpartum hemorrhage, etc.) and fetal complications (low birth weight, preterm birth, fetal death, etc.) as well as a low intelligent quotient in offspring.<sup>2-5</sup> So, levothyroxine is strongly recommended for the treatment of overt

## Abstract

### Background:

Successful treatment in patients with hypothyroidism depends on adequate knowledge, a positive attitude, and appropriate practices. Deficiency in any domain may lead to the persistence of symptoms, difficulty issues in pregnancy, as well as adverse effects on offspring in female patients.

### Objective:

To evaluate the knowledge, attitude, and practice (KAP) of reproductive-aged adult (18 – 45 years) females with hypothyroidism and their associations with current treatment status.

### Methods:

This cross-sectional questionnaire-based KAP survey was done at seven places across Bangladesh in government hospitals and private chambers among 393 hypothyroid patients [age: 30.0 (25.0-36.0), years, median (IQR)]. Adult females who could read and understand the Bangla language were included. Patients with known dementia, illiterate, severely ill, and unwilling to participate were excluded. The knowledge domain consisted of ten single-best multiple-choice questions (MCQs: 3-4 choices). The attitude domain had five statements with a five-point Likert scale ranging from strongly agree to strongly disagree. The practice domain had also ten single best MCQs (3-5 choices) to assess the patients' most common practice behaviors. The questionnaire was supplied to each patient and advised to put a tick mark at the appropriate option. Patients' treatment status was considered by current serum TSH levels (0.4 – 4.0 mIU/mL).

### Results:

The percent of over-replacement, appropriate replacement, and under-replacement was around 12%, 47%, and 41% of the study population respectively. Around 39% had good knowledge, 78% were highly concerned about thyroid disorders, and only 22% were highly cautious about their practice. Age and educational status might be associated with all three domains.

### Conclusions:

More than half of the reproductive-aged adult females' treatment status was inappropriate. Discrepancies among the three domains might be associated with the age and knowledge status of the participants. The study findings will help clinicians to manage patients with hypothyroidism more efficiently.

**Keywords:** hypothyroidism, Knowledge, Attitude, Practice, reproductive-aged females

hypothyroidism as well as in most cases of SCH during pregnancy.

There is no available national data for the prevalence of hypothyroidism and SCH from Bangladesh; a community-based study conducted in Khulna (nonendemic for goiter) found the prevalence of subclinical hypothyroidism and hypothyroidism of 6.6% and 5.0% respectively with young aged females affected more.<sup>6</sup> A hospital-based study found that around 11.9% and 17.1% of pregnant women had newly detected hypothyroidism and subclinical hypothyroidism respectively.<sup>7</sup> A meta-analysis conducted among Indian women showed a prevalence of hypothyroidism and SCH of 2.7% and 9.5% respectively during pregnancy.<sup>8</sup> So, hypothyroidism and SCH are also not uncommon during pregnancy.

Despite a lot of complications, the treatment of hypothyroidism is relatively simple. However, knowledge about thyroid disease is poor among Bangladeshi women. Their attitudes toward thyroid risk are incorrect with misconceptions, and they have high thyroid risk health behavior and wrong lifestyle towards these thyroid risks.<sup>9</sup> Besides, there are several behavioral practices required for successful treatment. These poor practices may increase during pregnancy from the general hesitations of using any drugs to avoid harmful effects on the fetus as well as treatment burden.<sup>10</sup> False beliefs may cause poor treatment adherence and ultimately poor maternal and fetal outcomes.<sup>11</sup> So, the duty of the prescribing physician is to counsel and educate adequately about the benefits vs. risks of levothyroxine use during pregnancy. However, this type of session is conducted in below half of the cases even in developed countries.<sup>12</sup> Before doing such a session, it is very essential to know the patient's current knowledge, attitude, and practices (KAP) towards the disease. However, data regarding these issues are very limited from Bangladeshi patients of reproductive-aged females. Hence, we aimed to assess the KAP of reproductive-aged females with hypothyroidism and their associations with current thyroid status.

#### **Methods:**

This cross-sectional questionnaire-based KAP survey was done at seven places across Bangladesh in government hospitals and private

chambers among 393 hypothyroid patients [age: 30.0 (25.0-36.0), years, median (IQR)]. Adult females with regular menstrual cycles, taking levothyroxine for at least six months, and who could read and understand the Bangla language were included. Patients with known dementia, illiterate, severely ill, and unwilling to participate were excluded. The study was conducted according to Helsinki declaration. Informed consent was taken from each participant.

The knowledge domain consisted of ten single-best multiple-choice questions (MCQs: 3-4 choices). The attitude domain had five statements with a five-point Likert scale ranging from strongly agree to strongly disagree. The practice domain had also ten single best MCQs (3-5 choices) to assess the patients' most common practice behaviors. Three questions related to the intake of levothyroxine were transformed into one question. The questionnaire was supplied to each patient and advised to put a tick mark at the appropriate option. Patients were not helped to read or for comprehension during the questionnaire fill-up. Patients' treatment status was categorized by current serum TSH levels considering reference levels of 0.4 to 4.0 mIU/mL.

In the knowledge domain, each correct answer was given a '1' point without any negative markings. After calculating the total score, participants were categorized into good (7-10), average (4-6), and poor (0-3) levels of knowledge. Considering the total number of strongly agree/agree to the five statements, the levels of attitude domain were classified as highly concerned (4-5), concerned (2-3), and little/ no concerned (0-1). Similar to the knowledge domain, each correct answer from the practice domain was also given a '1' mark without any negative marks. Depending on total scores, the study population was divided into highly cautious (7-8), cautious (4-6), and poorly cautious (0-3).

Data were edited and analyzed by SPSS software version 22.0. Data were expressed in median (interquartile range, IQR) or frequency (percentages, %). Missing data were included in the analysis or excluded by mentioning available numbers. Comparisons between/among groups were done by Mann-Whitney U test, Kruskal Wallis one-way ANOVA or Pearson's Chi-square test along with post hoc tests if required. Any

p-value below 0.05 was considered statistically significant.

### Results:

Considering current serum TSH levels, more than 50% of the study participants had inappropriate replacement status (over replacement, 12.2%, and under replacement, 40.5%). Participants were statistically similar with respect to age, educational status, and disease duration (ns for all), except the median of levothyroxine dose which was significantly higher in over replacement group than under-replacement group (post hoc  $p=0.021$ ) (Table-I).

Nearly 70% of the study participants were aware of the importance of thyroid function tests (TFTs) in planning pregnancy as well as the requirement of early consultation soon after confirmation of pregnancy. Around 62% of the participants knew the importance of the control of hypothyroidism before pregnancy. Only one-third of participants could identify the appropriate timing of testing TFT, iodine requirement, and neonatal screening of TFT. More than 50% of them knew about the adverse consequences of uncontrolled hypothyroidism on pregnancy and the IQ of a

baby. While around 60% of participants thought short stature was an indication of TFTs, only 43% thought poor school performance was an indication of TFTs (Table-II).

The response of the attitude domain showed that most of the patients agreed/strongly agreed with all of the statements. Around 93% of the study participants agreed about the learning of this disease well. The reliability statistics of Cronbach's alpha of 0.762 of the five statements indicate acceptable internal consistency of the items of the attitude domain (Figure-1).

The practice domain showed that more than one-third of the females with hypothyroidism forgot to check the expiry date before buying levothyroxine. A similar fraction of the study population gave a history of inappropriate levothyroxine intake in relation to meals and other drugs that interfere with its absorption. Around two-thirds of the study participants omitted the drug if they missed it. Around 27% stopped the drugs at least once thinking permanent cure to the disease, and 3.6% had tried alternative medicine. Nearly 42.0% did not visit physicians according to the advice (Table-III).

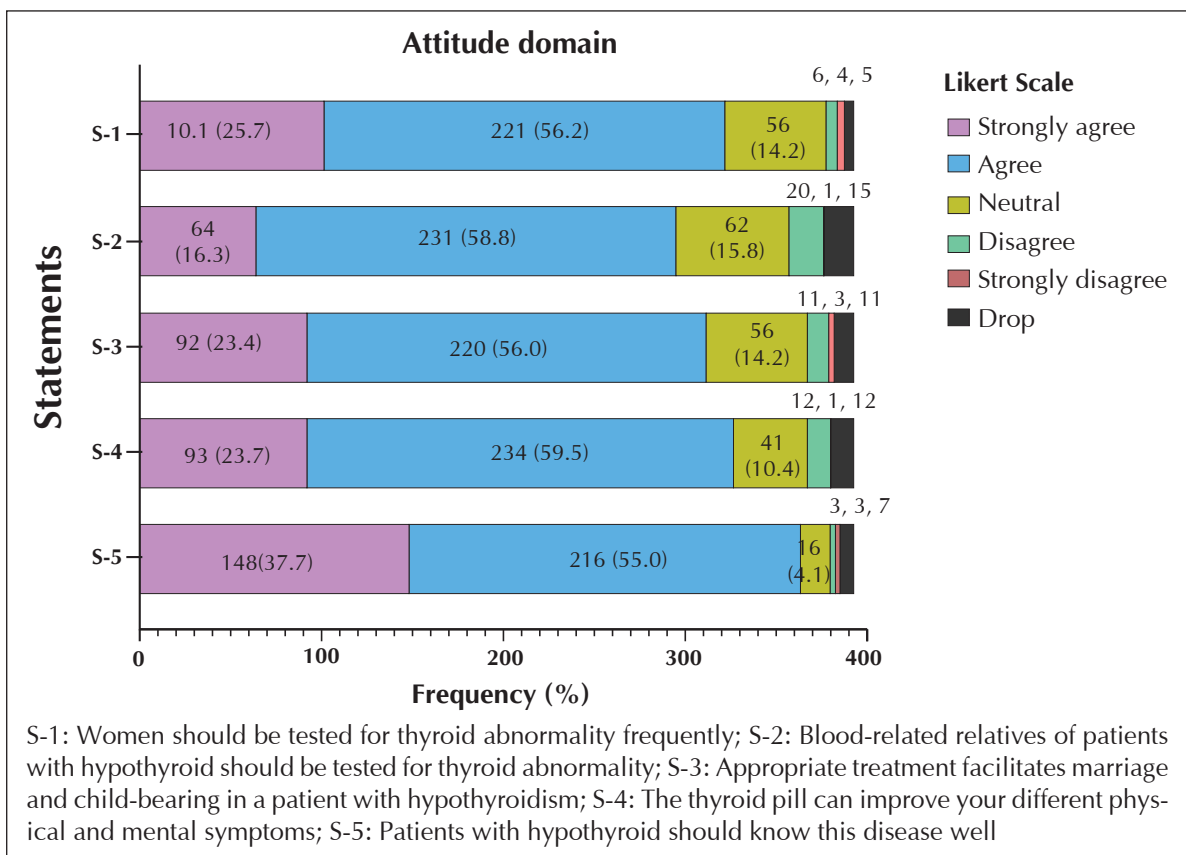
**Table-I: Baseline characteristics with thyroid status according to current treatment status (n=393)**

Variables	Over replacement	Appropriate replacement	Under replacement	p-value
Number (%)	48 (12.2)	186 (47.3)	159 (40.5)	
Age, years	30.0 (25.0-36.0)	30.0 (25.75-36.0)	30.0 (25.0-36.0)	0.914* 0.938 <sup>†</sup>
Age group in years				
<30	23 (47.9)	84 (45.2)	76 (47.8)	0.869
30	25 (52.1)	102 (54.8)	83 (52.2)	
Educational status				
<SSC	10 (20.8)	34 (18.3)	36 (22.6)	0.394
SSC-HSC	19 (39.6)	93 (50.0)	81 (50.9)	
>HSC	19 (39.6)	59 (31.7)	42 (26.4)	
Disease duration, years	1.0 (0.5-3.0)	2.0 (0.83-4.0)	1.5 (0.67-3.0)	0.057* 0.102 <sup>†</sup>
Duration of disease status				
<1 year	23 (47.9)	55 (29.6)	59 (37.1)	0.163
1 – 5 years	21 (43.8)	104 (55.9)	81 (50.9)	
>5 years	4 (8.3)	27 (14.5)	19 (11.9)	
L-thyroxine dose, µgm/d	75.0 (50.0-100.0)	50.0 (50.0-75.0)	50.0 (50.0-75.0)	0.158* 0.026 <sup>†</sup>
Dose status				
50 µgm/d	19 (39.6)	104 (55.9)	98 (61.6)	0.106
51 – 100 µgm/d	22 (45.8)	60 (32.3)	43 (27.0)	
>100 µgm/d	7 (14.6)	22 (11.8)	18 (11.3)	

Kruskal-Wallis one-way ANOVA (\*distribution and <sup>†</sup>medians) or Pearson's chi-square test was done as appropriate

**Table-II: Response of the study population on knowledge domain (n=393)**

Statements	Frequency (%)			
	Yes	No	Unknown	Drop
Thyroid hormone should be tested before planning pregnancy	286(72.8)	4(1.0)	101(25.7)	2(0.5)
Pregnancy should be planned after control of hypothyroidism	244(62.1)	5(1.3)	143(36.4)	1(0.3)
Consultation with a doctor should be done soon after confirmation of pregnancy	273(69.5)	34 (8.7)	84(21.4)	2(0.5)
Monthly thyroid tests should be done during the first 5 months of pregnancy	109(27.7)	1(0.3)	276(70.2)	7(1.8)
Iodine requirement is increased during pregnancy	141(35.9)	10(2.5)	231(58.8)	11(2.8)
Failure to control hypothyroidism during pregnancy leads to an increased risk of abortion	214(54.5)	1(0.3)	171(43.5)	7(1.8)
Failure to control hypothyroidism during pregnancy leads to low IQ baby	202(51.4)	2(0.5)	185(47.1)	4(1.0)
Thyroid hormone should be tested in the baby after 48 hours of birth	120(32.8)	8(2.0)	255(64.8)	1(0.3)
Thyroid hormone should be tested in children with short stature	238(60.6)	1(0.3)	152(38.7)	2(0.5)
Thyroid hormone should be tested in children with poor school performance	167(42.5)	13(3.3)	209(53.2)	4(1.0)



**Figure-1: Response of the study population on attitude domain (n=393)**

**Table-III: Response of the study population on practice domain (n=393)**

Questions/ Statements	Yes	No	Drop
Always check the expiry date before buying drugs.	250(63.6)	140(35.6)	3(0.8)
Keep the drugs always in a dry and sunlight-free place.	329(83.7)	58(14.8)	6(1.5)
Always take the drug 30 – 60 minutes before breakfast/ 3 hours after the last meal.	238(60.6)	146(37.7)	9(2.3)
Simultaneous intake of PPI/iron/calcium tablets?	225(57.3)	164(41.7)	4(1.0)
Appropriate measures were taken if forgot to take the drug.	129(32.8)	260(66.2)	4(1.0)
Ever stopped to take the drugs thinking that it has cured?	281(71.5)	106(27.0)	6(1.5)
Was any alternative treatment taken?	374(95.2)	14(3.6)	5(1.3)
Usual follow-up test according to a physician	221(56.2)	165(42.0)	7(1.8)

Overall, around 38.9% of the study participants had good knowledge about the management of hypothyroidism during pregnancy and its impact on their children. Nearly 77.9% were highly concerned about their disease status. Around 63.9% were cautious about their practice behavior with levothyroxine. However, there were no statistically significant associations of treatment status with any of the three domains of assessment (Table-IV).

Females with good (post hoc  $p=0.036$ ) and average (post hoc  $p=0.025$ ) knowledge were significantly younger than those with poor knowledge. There was no significant difference in

age with respect to the attitude domain in post hoc analysis. Highly cautious females were significantly younger than poorly cautious females (post hoc  $p=0.023$ ). Females with poor knowledge had significantly lower educational status than those with good knowledge. In females with poor knowledge, percentages of little/no concern were higher than those with high concern in post hoc analysis. There was no significant association between the practice domain with educational status in post hoc analysis. Females with good knowledge took a significantly higher dose of levothyroxine than those with poor knowledge (post hoc  $p=0.015$ ) (Table-V).

**Table-IV: Associations of knowledge, attitude, and practice domain subgroups with levothyroxine replacement status (n=393)**

Domain	Levels (total scores)	Frequency (%)				p-Value
		Total	Over-replacement	Appropriate replacement	Under replacement	
Knowledge	Good (7–10)	153 (38.9)	16 (33.2)	72 (38.7)	65 (40.9)	0.914
	Average (4–6)	110 (28.0)	15 (31.3)	53 (28.5)	42 (26.4)	
	Poor (0–3)	130 (33.1)	17 (35.4)	61 (32.8)	52 (32.7)	
Attitude	Highly concerned (4–5)	306 (77.9)	35 (72.9)	142 (76.3)	129 (81.1)	0.076
	Concerned (2–3)	62 (15.8)	6 (12.5)	35 (18.8)	21 (13.2)	
	Little/no concerned (0–1)	25 (6.4)	7 (14.6)	9 (4.8)	9 (5.7)	
Practice	Highly cautious (7–8)	88 (22.4)	11 (22.9)	42 (22.6)	35 (22.0)	0.305
	Cautious (4–6)	251 (63.9)	31 (64.6)	125 (67.2)	95 (59.7)	
	Poorly cautious (0–3)	54 (13.7)	6 (12.5)	19 (10.2)	29 (18.2)	

Pearson's chi-square test was done

**Table-V: Associations of knowledge, attitude, and practice domain with baseline characteristics of the study population**

Variables	Knowledge domain				Attitude domain (concerned)				Practice domain (cautiousness)			
	Good 7-10	Average 4-6	Poor 0-3	Overall p	High 4-5	Average 2-3	Little/ no 0-1	Overall p	High 7-8	Average 4-6	Poor 0-3	Overall p
No.	153	110	130		306	62	25		88	251	54	
Age, years	29.0 (25.0-36.0)	29.0 (25.0-34.0)	33.0 (25.0-38.0)	0.012	29.0 (25.0-36.0)	32.0 (26.0-38.0)	33.0 (29.5-40.0)	0.021	29.0 (25.0-35.0)	30.0 (25.0-36.0)	33.0 (27.0-38.0)	0.029
Educational status												
<SSC	22 (14.4)	14 (12.7)	44 (33.8)		45(14.7)	20(32.3)	15(60.0)		10(11.4)	52(20.7)	18(33.3)	
SSC-HSC	66 (43.1)	61 (55.5)	66 (50.8)	<0.001	159(52.0)	28(45.2)	6(24.0)	<0.001	49(55.7)	117(46.6)	27(50.0)	0.011
>HSC	65 (42.5)	35 (31.8)	20 (15.4)		102(33.3)	14(22.6)	4(16.0)		29(33.0)	82(32.7)	9(16.7)	
Duration of disease, years	2.0 (0.75-4.0)	1.1 (0.6-3.3)	1.5 (0.7-3.0)	0.759	1.5 (0.8-4.0)	2.0 (0.8-3.0)	1.3 (0.6-3.9)	0.437	1.3 (0.8-3.0)	2.0 (0.7-4.0)	1.8 (0.8-4.0)	0.705
Dose of L-thyroxine, µgm/day	75.0 (50.0-100.0)	50.0 (50.0-100.0)	50.0 (50.0-75.0)	0.009	50.0 (50.0-77.7)	50.0 (50.0-75.0)	50.0 (25.0-112.5)	0.842	33.0 (27.0-38.0)	21.0 (9.0-48.0)	50.0 (50.0-100.0)	0.279

Independent samples median test with post hoc Dunn’s test or Pearson’s chi-square test with post hoc analysis from residuals was done

**Discussion:**

In this KAP study, more than half of the reproductive-aged adult females’ treatment status was inappropriate without significant association with KAP status. We also found moderate levels of knowledge, a high attitude toward thyroid disorders, along with moderate levels of practice among patients with hypothyroidism. Age and educational status might be associated with these KAP performances.

Even after 6 months of levothyroxine therapy, more than half of them were not getting an appropriate replacement dose with levothyroxine. However, there were no statistically significant associations between thyroid replacement statuses with levels of KAP. In a study conducted among 1925 Indian adults (81% females), 42% were under-treated, and 13% were over-replaced after 2 months of treatment with reference levels of 0.4 – 4.0 mIU/ml.<sup>13</sup>

Around 40% of the study population had good knowledge about the effects of hypothyroidism on pregnancy and their children. Euthyroid status is

one of the important factors for normal ovulation as well as successful pregnancy, especially in females with subfertility and positive anti-thyroid peroxidase antibody.<sup>14</sup> So, TFTs should be checked before planning a successful conception in females with hypothyroidism. In our study, around 73% of the study population knew this fact and nearly 62% were aware of the control of hypothyroidism before planning the pregnancy. Due to several factors, there is an increased requirement for the dose of levothyroxine during pregnancy. So, it is recommended to increase the levothyroxine dose by 30 – 50% immediately after conception or increase intake by 1 – 2 extra tablets per week. Unfortunately, none of our patients had this knowledge, however, around 70% knew that they had to visit doctors as soon as possible after confirmation of pregnancy. The fetal thyroid becomes independent of the mother’s blood levels of free thyroid hormones at 16 – 20 weeks of pregnancy. So, the TSH levels should be kept within trimester-specific targets, especially during the first 5 months of pregnancy. So, TSH should be measured every 4 weeks during the 1<sup>st</sup> 5 months.<sup>15</sup> However, around 70% of our study population was unaware of this. Due to several physiological changes, iodine requirement is increased during

pregnancy. However, around 59% of the study population did not know this information. However, this figure is far better than a study (~38%) conducted among Mexican women.<sup>16</sup> On the other hand, in a study conducted among 165 females from Saudi Arabia with known thyroid disorders (including 76% of hypothyroidism), nearly 82% knew the importance of TFT before pregnancy and around 71% knew about the dose adjustment during pregnancy.<sup>17</sup>

Uncontrolled hypothyroidism may have adverse effects on pregnancy and the fetus. Nearly 45% of our study population had no idea about the effects of uncontrolled hypothyroidism on pregnancy and fetuses. One previous study showed better knowledge (~90%) regarding this issue.<sup>17</sup> Screening newborns for congenital hypothyroidism is a blessing that can prevent mental retardation. However, only one-third of our study population correctly knew the timing of newborn screening for hypothyroidism. A study conducted among Pakistani pregnant women showed poor knowledge about newborn screening that markedly improved after a health education intervention.<sup>18</sup> Thyroid hormones also play a key role in the growth and development of children. Around 61% and 43% of the study population had ideas about the role of thyroid hormone in the achievement of normal height and intelligence of children. Among 288 women, 54.2% knew the importance of thyroid hormone in brain development in a study conducted by Treki et al.<sup>19</sup>

The study participants showed high attitudes to all 5 statements. Prasanna et al. found similar findings among infertile females with hypothyroidism.<sup>20</sup> Age and educational status were associated with attitude in our study, which is similar to that study too.<sup>20</sup> Maheshwari et al. found that more than half of the study population had incorrect knowledge, beliefs, and practice that improved after education.<sup>21</sup>

The practice domain showed that more than one-third of the females with hypothyroidism forgot to check the expiry date before buying levothyroxine. A similar fraction of the study population gave a history of inappropriate levothyroxine intake in relation to meals and other drugs that interfere with its absorption. Around two-thirds of the study participants omitted the drug if they missed it. Prasanna et al. (2020) found 68% of the study population missed doses and

60% took other medicine at a time.<sup>21</sup> A study conducted in Delhi, India among 250 participants (~86% females) showed that ~90% of the study participants were adherent to treatment.<sup>22</sup> Around 27% stopped the drugs at least once thinking permanent cure to the disease, which is better (35%) than a study conducted in central India.<sup>23</sup> In our study nearly 3.6% had tried alternative medicine. Beliefs in alternative medicine were also reported in other studies at different percentages.<sup>17,20,22</sup> Nearly 42.0% of our study participants did not visit physicians according to the advice.

#### **Conclusions:**

Thyroid replacement status is abnormal in half of the reproductive-aged adult Bangladeshi females. Despite a high attitude toward thyroid disorders, the knowledge and practice of reproductive-aged Bangladesh females are modest. This discrepancy may be related to age and educational status. The study findings will help clinicians and policymakers to take necessary steps for better management of reproductive-aged females for a successful pregnancy.

#### **Conflict of interest:**

None of the authors have any conflicts of interest to disclose.

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Nil

#### **Authors' contributions:**

All the authors were involved in planning and data collection. MSM analyzed the data and wrote the manuscript. Other authors edited the manuscript. All authors read the manuscript and approved for publication.

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