

## A STUDY OF KNOWLEDGE, ATTITUDES AND PRACTICES REGARDING NUTRITION DURING CARE OF TUBERCULOSIS PATIENTS AMONG NURSING STAFF OF A TERTIARY CARE HOSPITAL

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### Abstract

**Background:** Nutrients boost the host's immune responses against various pathogens including mycobacterium tuberculosis. People with latent tuberculosis do not exhibit any clinical signs or symptoms of illness because the infection is contained by their immune system. The direct evidence of effect of nutrition on tuberculosis is difficult but the weight of evidence still favors the view that malnutrition may be an important factor in the high susceptibility and morbidity from tuberculosis.

**Aim and objectives:** To find out the knowledge regarding nutrition, attitude towards it and practices of nutrition among nursing staff involved in the management of tuberculosis patients.

**Material and methods:** This study was carried out in a tertiary care teaching hospital. A total seventy nursing staff, involved in care of tuberculosis patients either in tuberculosis wards and OPDs, participated in the study. Assessment of Knowledge, Attitude and Practices regarding nutrition was done with pretested and structured questionnaire.

**Statistical analysis:** Percentages, Means, Chi-square test and ANOVA using the SPSS 17.0 Software.

**Results:** GNM trained participants with work experience of more than 3 years were much better than B.Sc. nursing students regarding their knowledge about daily caloric requirements, dietary recommendations for tuberculosis patients and influence of dietary habits on tuberculosis outcome ( $p < 0.05$ ) but there was no statistically significant difference in the mean score of their knowledge about food nutrients. Both the groups showed positive attitude towards morning breakfast and having 3 meals and snacks in a day. Skipping of breakfast was more common among the GNM staff as compared with B.Sc. nursing students ( $P < 0.05$ ).

**Conclusions:** Results from the study indicated KA scores higher than P scores. The effect of nutritional supplementation on tuberculosis prevention and health outcomes among health care workers had not previously been systematically reviewed. This study will provide guidance on recommendations for nutritional care among health care workers who are directly involved in care of patients with tuberculosis.

**Keywords:** Nutrition, Tuberculosis, Knowledge, Attitudes and Practices, Nursing staff.

### Introduction

An essential dietary nutrient is a substance that a person needs to consume in order to live, grow and be healthy. Nutrients are required to regulate body processes and build and repair tissues and thereby promote health and prevent disease. Macronutrients (protein, carbohydrate and fat) are generally consumed in large amounts. Carbohydrate and some fat are converted to energy, while protein and some fat are used to make structural and functional components of human tissue. Micronutrients (vitamins and minerals) are consumed in small amounts and are essential for metabolic processes. Macronutrients and micronutrients work together to contribute to tissue regeneration and cellular integrity.

Malnutrition is a general term that refers to either overnutrition or undernutrition or both. Undernutrition refers to a state when the nutritional status of the person is suboptimal and thereby health and growth may be limited. Undernutrition may be due to illness that impairs nutrient intake and metabolism, or result from inadequate intake of macronutrients, micronutrients or both <sup>[1, 2]</sup>.

Under nutrition persists as a major global health concern, particularly in sub-Saharan Africa, South Asia, and regions of Latin America <sup>[3]</sup>. Dietary intakes of populations in these areas are often chronically deficient in macronutrients, micronutrients (leading to specific micronutrient deficiencies), or both leading to protein-energy malnutrition (PEM) <sup>[4]</sup>.

Malnutrition increases the vulnerability to infection through impaired immunity, and infection exacerbates the condition, further weakening the immune response<sup>[5]</sup>. Certain micronutrients, including vitamin A, iron, and zinc, are important immunomodulators and thereby are crucial to the host in mounting an effective response to infection. Iron supports immunity through cytokine production and function, and lymphocyte proliferation<sup>[6]</sup>. Zinc is essential for highly proliferating cells in the immune system and influences both innate and acquired immune functions<sup>[7]</sup>. Vitamin A deficiency compromises innate immunity through the degradation of mucosal epithelial barriers and impaired development of neutrophils, macrophages, and NK cells<sup>[8]</sup>.

Under nutrition increases the risk of tuberculosis (TB) and in turn TB can lead to malnutrition. TB itself leads to reduction in appetite, nutrient malabsorption, micronutrient malabsorption, and altered metabolism leading to wasting and poor nutritional status<sup>[9,10]</sup>.

World Health Organization estimates that, in 2016, there were 10.4 million new TB cases worldwide. 90% of cases were in adults and 10% in children with a male: female ratio of 1.6:1. There were 1.4 million TB deaths in 2015<sup>[11]</sup>.

Though the available data suggest that the TB epidemic may be on the decline, India continues to be the highest TB burden country in the world in terms of the absolute numbers of incidence cases each year. Mortality due to TB is the third leading cause of years of life lost, in the country. The estimated incidence (new TB cases per year) is 2.8 million cases in 2015 per 100000 populations<sup>[12]</sup>.

The diversity of TB epidemiology in the country necessitates different approaches to be adopted for addressing the problem.

In the 21st century, tuberculosis is still the most frequent underlying cause of wasting worldwide. However, pathophysiology of wasting in tuberculosis remains poorly understood. The prevalence of widespread malnutrition in the population may be expected to pose some special problems with regard to the control of the tuberculosis in the developing countries from the larger point of view of prevention and therapeutic management of individual cases, from the narrower clinical point of view.

The direct evidence of effect of nutrition on tuberculosis is difficult because of whole complex of coincident environmental factors. Despite these limitations, the weight of evidence still favors the view that malnutrition may be an important factor in the high mortality and morbidity from tuberculosis in population subjected to food shortage. Because undernutrition increases the risk of progression from TB infection to active TB disease, food insecurity and poor general nutritional status in the

population are important contributors to the global burden of TB disease<sup>[13]</sup>.

So, with this background knowledge, we planned this study for estimating the relationship between malnutrition and predisposition to tuberculosis infection in general population and especially among health care workers, who are directly involved in handling and care of TB patients.

## MATERIAL AND METHODS

This is a cross-sectional questionnaire based study conducted in a tertiary care hospital. Nursing staff that is involved in caring of TB patients, either in the hospital wards or OPDs, at the time of study or was involved in caring TB patients in the past were selected from whole nursing cadre of the hospital.

This nursing population was of either gender and, of any age, any years of experience in nursing field and of any educational background (GNM or B.Sc. Nursing). All participants enrolled voluntarily into the study and gave written, informed consent. The study had ethical clearance from the Institutional ethics committee of B.J.Govt. Medical College and Sassoon General Hospital, Pune.

Participants were provided with structured questionnaire regarding nutrition. A structured questionnaire was developed by a panel of experts consisting of clinicians, nurses, dieticians, and other investigators. This questionnaire was pretested and modified accordingly. The questionnaire was with two parts. The first part gathered the demographic information, as well as physical examination data, including gender, age, height, weight, education level, residence and total experience in handling of TB patients.

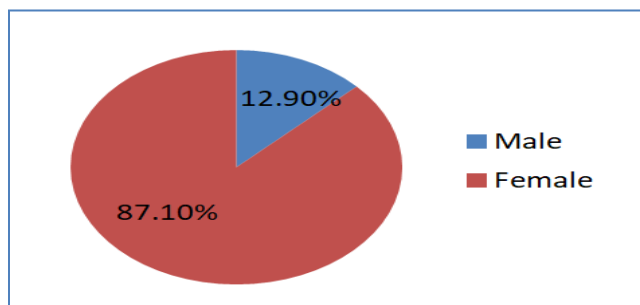
The second part of the questionnaire included the questions regarding Knowledge-Attitude-Practice (KAP) about nutrition. The questionnaire survey was conducted by trained investigators through face-to-face interviews with the participants. The participants were asked to answer independently without referring to any resources for responding to the questions.

## STATISTICAL ANALYSIS

Statistical analyses were performed using the Statistical Package for Social Sciences (version 17.0, SPSS,) software. Means, standard deviation and percent were calculated for the scores from the nutrition knowledge, attitude and food practices sections. Chi square correlation was used to assess the correlation between nutrition knowledge, the attitude and practices of participants. Analysis of variations (ANOVA) was used to evaluate nutrition knowledge and the attitude between participants having different educational background and work experience. Statistical results were considered to be significant at  $p \leq 0.05$ .

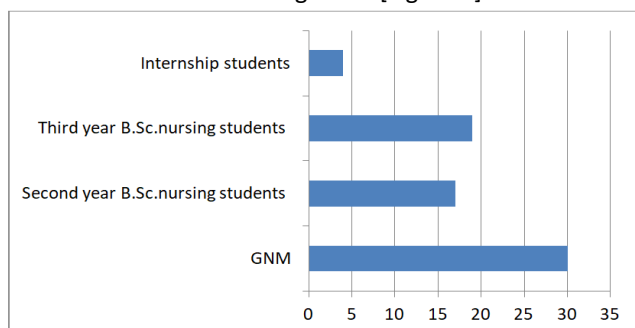
## RESULTS

A population of 82 nursing staff that involved in caring of TB patients, either in the hospital wards or OPDs, was identified amongst whole nursing staff of the hospital. Out of 82, seventy responded to the distributed questionnaire (85.36%). Among the respondents, 61 (87.1%) were females while 9 (12.9%) were males [Figure 1].

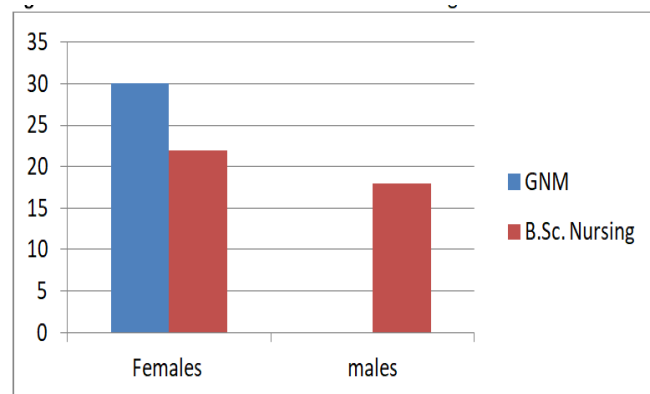


**Figure 1:** Gender distribution of participants

Out of 70, 30 respondents (42.85%) had completed their GNM training and were working as regular nursing staff in the hospital and 40 (57.14%) were pursuing their B.Sc. nursing course. Out of 40 B.Sc. nursing students, 17 were in the second year, 19 were in the final year and rest 4 was doing their internship [Figure 2]. All thirty GNM participants were females, while 22 were females and 18 were males from B.Sc. background [Figure 3].

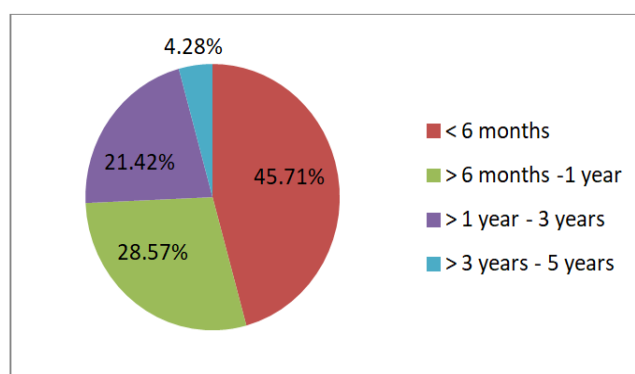


**Figure 2:** Educational background of participants



**Figure 3:** Gender distribution with educational background

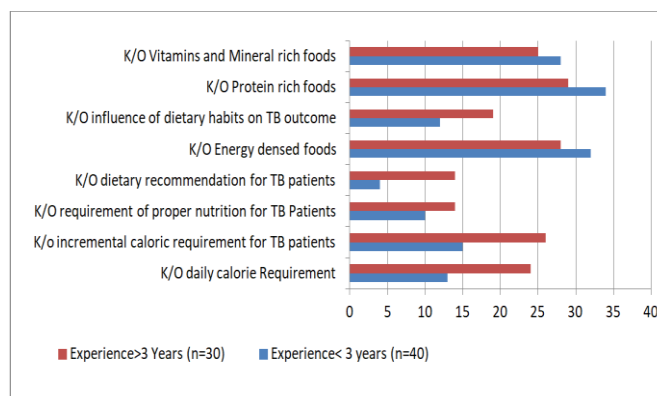
The mean age of GNM staff was  $24.74 \pm 1.73$  (range, 22- 40 years) and B.Sc.nursing students was  $21 \pm 0.92$  years (range, 19- 22 years). As far as experience in nursing care considered, all GNM staff was involved in regular nursing care as a part of their profession and having experience of more than 12 years, while B.Sc. nursing students had experience in nursing care of 1-3 years. For their experience of working in tuberculosis ward or OPD, we had received a varied result. Out of 70 respondents, 32 (45.71%) were having an experience of less than 6 months, 20 (28.57%) were having an experience of more than 6 months but less than 1 year, 15 respondents (21.42%) were having an experience of more than 1 year but less than 3 years and only 3 respondents (4.28%) had an experience of working in tuberculosis ward of more than 3 years but less than 5 years [Figure 4].



**Figure 4:** Work experience in TB ward or OPD

### Knowledge of nutrition:

Among the respondents, all were aware that there is an increased need of nutrition during an active TB infection. Figure 5 shows their nutrition knowledge stratified by their total nursing work experience.



**Figure 5:** Nutrition knowledge stratified by total nursing work experience

When we stratified study population according to work experience, we actually got the participants divided according to their educational background. We found that

participants with GNM training and nursing work experience more than 3 years were much better than B.Sc. nursing students with reference to their knowledge regarding daily caloric requirements, dietary recommendations for TB patients and influence on dietary habits on TB outcome. The difference was statistically significant [Table 1].

**Table 1:** Comparison of knowledge variables stratified by experience

Knowledge variables	Experience > 3 years (n=30) (Positive answers %)	Experience < 3 years (n=40) (Positive answers %)
Recommended daily caloric requirement	80*	32.5
Dietary recommendation for TB patients	46.7*	10
Influence of dietary habits on TB outcome	63.3*	30
Energy dense foods	93.3**	80
Protein rich foods	96.7**	85
Vitamins and Mineral rich foods	83.3**	70

\*p < 0.05, \*\* p > 0.05

There was no statistically significant difference in the mean score of their knowledge about energy dense, protein rich and vitamin rich foods [Table2].

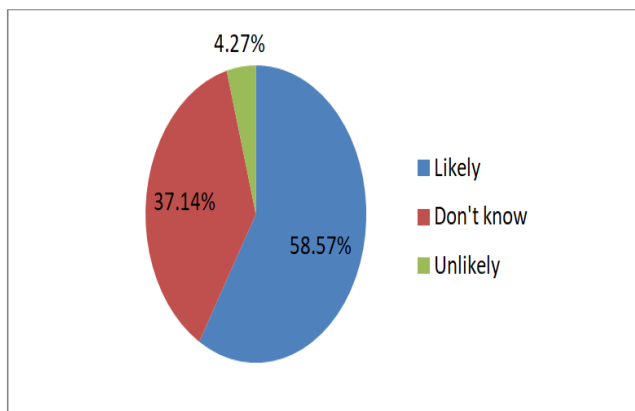
**Table 2:** Comparison of mean scores for knowledge

Mean scores	Experience > 3 years	Experience < 3 years	ANOVA
Knowledge of nutritional requirements and dietary habits	6.42 ± 3.59	5.66 ± 2.58	0.025 (s)
Knowledge of food nutrients	3.1 ± 2.1	3.3 ± 2.0	0.11 (ns)

s- significant; ns- not significant

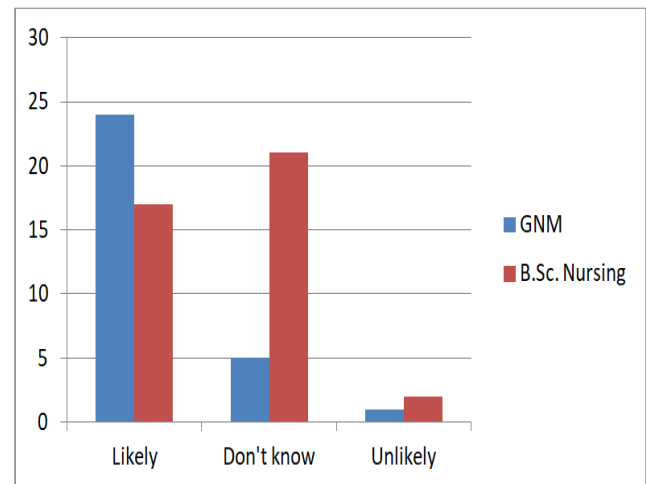
#### Attitude towards nutrition:

Among 70 respondents, 41 (58.57%) thought that they are having a balanced diet while 26 (37.14%) responded as they had no idea about it while 3 (4.27%) thought it is unlikely that they are having balanced diet [Figure 6].



**Figure 6:** Likelihood having balanced diet

21(52.5%) B.Sc. nursing students had no idea about having a balanced diet while 9 (16.67%) GNM trained staff were of such opinion [Figure 7].



**Figure 7:** Likelihood having balanced diet with educational background

Among the other parameters tested for attitude towards nutrition, such as considering undernutrition as a risk for acquiring TB infection, having morning breakfast and having 3 meals and snacks in a day, all 70 (100%) had a positive attitude towards these parameters.

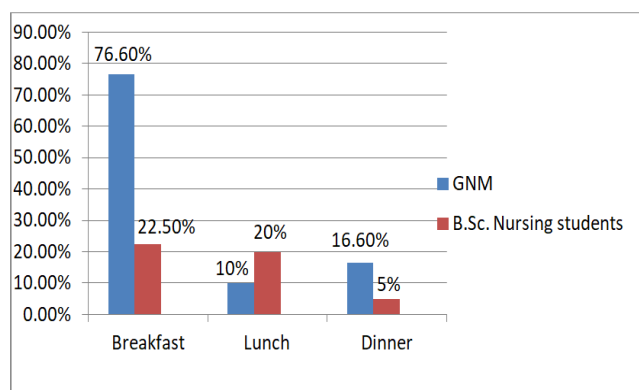
#### Practice of nutrition:

On analyzing the breakfast eating habits, between B.Sc. nursing students and GNM staff, before going to TB wards or OPDs, it was found that the difference was statistically significant (P < 0.05). Only 43% of the GNM staff took breakfast daily or 3-4times/week as compared to 78% of B.Sc. nursing students. Skipping of breakfast was more common among the GNM staff (53%) as compared with B.Sc. nursing students (13%) [Table 3].

**Table 3:** Comparison of breakfast habits among study groups

		Breakfast habit			
		Daily	3-4d/week	1-2d/week	Rarely
GNM staff	(n=30)	10 (33%)	03 (10%)	01 (3%)	16 (53%)
B.Sc. nursing students	(n=40)	10 (33%)	21 (53%)	04 (10%)	05 (13%)

32 (45.7%) participants had missed their breakfast, 11 (15.7%) missed their lunch while 7 (10%) missed their dinner last week [Figure 9].



**Figure 9:** Comparison of missed meals during last week

### Discussion

We found that B.Sc.nursing students had generally poor knowledge about dietary recommendations for TB patients as compared to GNM trained staff. There was no significant difference between the two groups regarding knowledge of food nutrients. This may be due to difference in work experience among groups as GNM staff has more work experience in handling TB patients than B.Sc.nursing students (>12 years vs. 1 -3 years).

Sharma et al. (2008) <sup>[14]</sup> reported that nutritional knowledge is significantly related to dietary habits, but in our study we do not found this correlation. Although breakfast is considered as the main meal of the day, skipping of breakfast was more common among the GNM staff (53%) as compared with B.Sc. nursing students (13%). Also, we found that 78% of B.Sc. nursing students took their breakfast daily or 3-4times/week. This was consistent with the findings of Wong et al. (2011) who reported that 81% of the participants agree with the necessity of eating breakfast <sup>[15]</sup>.

Though both the groups showed positive attitude towards morning breakfast and having 3 meals and snacks in a day, GNM trained participants in this research pay little attention to breakfast, compared to those of B.Sc. nursing background. Although the current recommendation is to emphasizes on having breakfast. The usefulness of breakfast consumption is well recognized by nutritionists. The omission of breakfast relates to dietary patterns which are unfavorable for health <sup>[16]</sup>.

Prevalence of key items also confirms a need for further education and training to improve nutrition care in nursing staff; although a high percentage (88%) of staff already believes nutrition was important. Unfortunately, this belief did not always translate into practice as 45.7% participants missed their breakfast, 15.7% missed their lunch while 10% missed their dinner during the previous week of interrogation. Although the KA scores were relatively high for this group, the P scores demonstrate room for improvement. Exploratory analyses comparing groups of

staff based on their discipline and years of practice suggest potential differences in KAP worthy of further investigation. For years in practice, it was not surprising to have more experience relating to higher KA, however it was unexpected to have this equating to lower P scores. Since most differences were expected, it reinforced the need to focus on education of staff as well as ensuring the processes are in place to practice what is learned.

Several studies have shown that education can increase knowledge, yet this does not mean that it will improve practice immediately, as changing behavior is part of a continuous process <sup>[17]</sup>. For this reason, it is important to use a multi-faceted approach to behavior change that provides education and/or training, while also working on other components, such as having an environment conducive to the change <sup>[18]</sup>. If the processes are not in place for staff to apply their knowledge, education that increases knowledge is unlikely to influence practice.

### Limitations

It is important to note that these are self-perceived practices and may not be representative of what occurs in real life. There are also many more questions that could be asked, but given the busy schedule of hospital staff, the questionnaire had to be completed within a maximum of 10–15 min. Analysis of the KAP results observed differences based on years in practice; however, the sample size is not designed for these individual comparisons and any statistically significant differences should be interpreted with caution.

### Conclusions

The KAP questionnaire is a face valid and reliable questionnaire that has the potential to support understanding of staff KA and P with respect to nutrition care. The questionnaire can be used as a needs assessment in an educational project to improve these aspects. However, it may need to be adapted based on the context and applicability of questions within the needs assessment. Results from the study indicated that KA scores are higher than P scores, suggesting that education is not sufficient to change staff behavior with respect to best practice for nutrition care in hospital. Use of KAP questionnaires may also improve awareness in respondents as well as hospital management who approve its use. Overall, this questionnaire provides direction and feedback, which can be used by hospitals and researchers aiming to optimize nutrition care in hospital. The evidence concerning the effect of nutritional supplementation on TB prevention and health outcomes among people involved in care of TB patients had not previously been systematically reviewed.

This study will provide guidance on recommendations for nutritional care among health care workers who are directly involved in care patients with TB as part of their profession. This study looks at the nutritional awareness among health care workers which in turn can affect their nutritional status and their ability to fight TB infection. There is very little evidence in the literature that any specific food on its own or a specific quantity can alter the course of TB disease or be effective in the treatment of malnutrition. Further studies will be needed to recommend and to better understand the link between malnutrition and tuberculosis.

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**Author Contributions:** Dr. Sujeet Divhare and Dr. Sunita Girish were involved in all aspects of the research and publication. Dr. Satyashil Ingale led the study with supervision from Dr. Sujeet Divhare. Mr. Amit Divhare was involved in the development of the questionnaire, interpretation of results, statistical analysis and reviewing the publication. Mrs. Rajshree Korake facilitated the recruitment of participants.

## REFERENCES

1. Pae M, Meydani SN, Wu D. The role of nutrition in enhancing immunity in aging. *Aging Dis.* 2012 Feb; 3(1):91-129.
2. Fernandez ID, Himes JH, de Onis M. Prevalence of nutritional wasting in populations: building explanatory models using secondary data. *Bull World Health Organ* 2002; 80:282–91.
3. FAO, IFAD, UNICEF, WFP and WHO. 2019. The state of food security and nutrition in the World 2019. Rome: Food and Agriculture Organization.
4. Millward DJ, Jackson AA. Protein/energy ratios of current diets in developing countries compared with a safe protein/energy ratio: implications for recommended protein and amino acid intakes. *Public Health Nutr* 2004; 7:387–405.
5. Cunningham-Rundles S, McNeely DF, Moon A. Mechanisms of nutrient modulation of the immune response. *J Allergy Clin Immunol* 2005; 115:1119–28.
6. Wessling-Resnick M. Iron homeostasis and the inflammatory response. *Annu Rev Nutr* 2010; 30:105–22.
7. Shankar AH, Prasad AS. Zinc and immune function: the biological basis of altered resistance to infection. *Am J Clin Nutr* 1998; 68 Suppl: 447S–63S.
8. Stephensen CB. Vitamin A, infection, and immune function. *Annu Rev Nutr* 2001; 21:167–92.
9. WHO. Guideline: Nutritional care and support for patients with tuberculosis. Geneva: World Health Organization; 2013.
10. Krishna Bihari Gupta, Rajesh Gupta, et al. Tuberculosis and nutrition. *Lung India.* 2009 Jan-Mar; 26(1): 9–16.
11. World Health Organization. Global Tuberculosis Report 2016. World Health Organization (2017). Available from: [http://www.who.int/tb/publications/global\\_report/en/](http://www.who.int/tb/publications/global_report/en/) (accessed November 6, 2018).
12. Revised National Tuberculosis Programme of India. NSP draft for TB elimination 2017 – 25. (March 2017). Available from: <http://tbcindia.gov.in>WriteReadData>. (accessed November 6, 2018).
13. Chandrasekaran P, Saravanan N, Bethunaickan R, Tripathy S. Malnutrition: Modulator of Immune Responses in Tuberculosis. *Front Immunol.* 2017 Oct 18; 8:1316.
14. Sharma S.V.; Gernand A.D.; Day R.S. Nutrition knowledge predicts eating behavior of all food groups except fruits and vegetables among adults in the Paso del Norte region: Qué Sabrosa Vida. *Journal of Nutrition Education and Behavior.* 2008; 40(6): 361-368.
15. Wong Yueching; Huang Yi-chia; Chen Su-lin. Is the College Environment Adequate for Accessing to Nutrition Education? *Journal of Nutrition research.* 1999; 19(9): 1327-1337.
16. Ambroise Martin, Sylvie Normand and Monique Sothier. Is advice for breakfast consumption justified? *British journal of nutrition.* 2000; 84:337-344.
17. McCluskey, A.; Lovarini, M. Providing education on evidence-based practice improved knowledge but did not change behaviour: A before and after study. *BMC Med Educ.* 5, 40 (2005).
18. World Health Organization. A Guide to Developing Knowledge, Attitude and Practice Surveys, 2008. Available online: [http://apps.who.int/iris/bitstream/10665/43790/1/9789241596176\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/43790/1/9789241596176_eng.pdf) (accessed on 25 May 2017).