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Original Research Article

Effects of socio-demographic parametrs on anemia in antenatal women in Vijayapur district of North Karnataka- A cross sectional study

Prakash M Patil[1]*, Neelamma G Patil[1], Naqsh Thakur[1], Shrey Kumar[1]

[1]*Dept. of Pathology, BLDE (DU) Shri B M Patil Medical College Hospital and Research Centre, Vijayapura, Karnataka, India*

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ABSTRACT

Background: Anaemia is one of the leading causes of morbidity and mortality, especially among women having prevalence of approximately 41.8% among pregnant women. In India, Iron deficiency anaemia takes the highest share when it comes to prevalence pan nation.
Aims and Objectives: To study the prevalence of anaemia in pregnant women and the factors contributing to it in the population of Vijayapur district.
Materials and Methods: A cross sectional study conducted in a Tertiary care, Centre at Vijayapur, North Karnataka. All the consenting pregnant women between age 20 to 40 years of age and gestational age more than 37 weeks.
Results: 57.3% were in the age group of 21-24 years in which 67.4% were non anaemic, 13.9 % were mild anaemic, 17.4% were moderately anaemic, 1.1% were severely anaemic. 27.3% were in the age group of 25-29 years in which 65.8% were non anaemic, 12.1% were mild anaemic, 21.9% were moderately anaemic.
Discussion: Iron deficiency anemia is most prevalent in reproductive age group, low socio-economic status, Iron and Folic acid medication taken in pregnant women which was in concordance with other studies.
Conclusion: High prevalence of anaemia is a strong indicator of failure of the healthcare system at national and international level.

1. Introduction

Anaemia has acquired menacing proportions in our country so much so that it has become one of the leading causes of morbidity and mortality, especially among women who have not had proper access to education[1] or the ones who were less than 18 years when they first conceived.[2] WHO defines anaemia as a haematological disorder which is characterised by quantitative and qualitative reduction in haemoglobin content of an individual.[3] Global trends don't present a pretty picture either, with a prevalence of approximately 41.8% among pregnant women, the two extremes of the pendulum swinging between 5.7% in United States and 75% in Gambia.[4]

Developing countries account for a major chunk of the cases as far as prevalence of nutritional anaemia in pregnant women is concerned with statistics revealing an alarming 51% occurrence which stands in stark contrast to developed nations where prevalence is only about 14%.[2] Closer home (India) the situation can be best described as grim considering the fact that the burden of anaemia in Indian pregnant women is anywhere between 33-89%.[5] Women of child bearing age, pregnant and lactating women and young children are among those who bear the major brunt of this dreadful disease.[6] Even the developed countries have not managed to escape from its clutches which is evident by the fact that a significant percentage of

* *Corresponding author*.
E-mail address: prakash.patil@bldedu.ac.in (P. M. Patil).

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women in child bearing age (4-12%) suffer from it.[7] In India, Iron deficiency anaemia takes the lions share when it comes to prevalence pan nation.[8] The etiological routes of this type of anaemia can be traced to factors like poverty, poor sanitation, parasitic infestation, limited access to health care, menstrual blood loss and pregnancies which are perilously closely spaced.[9,10] Manifestingly fatigue, weakness, inability to perform physical activity and clouding of mental concentration is common place, not to mention the plethora of catastrophic complications that follow, major among them being intrauterine growth retardation, increased risk of birth asphyxia and low Apgar score at birth.[2,9,10]

It's not just iron deficiency anaemia causing the problems but megaloblastic anaemia has also been found occasionally in pregnancy prevalent in poor income groups. It is also possible that iron deficiency anaemia may completely mask the megaloblastic anaemia.[11]

A marked increase in iron absorption ushers in the transfer of iron from mother to foetus under tight regulatory control of placenta. Weeks 12-25 of gestation are characterized by plummeting levels of serum ferritin, a process consequent to iron utilization in order to achieve expanded maternal red cell mass. Week 30 of gestation is the period when maternal iron absorption efficiency hits the roof. The apical surface of placental syntitio-trophoblast act as sites of absorption for circulatory iron coming from maternal blood via serum transferrin. The steps that follow include endocytosis of holo-transferrin, release of iron followed by apo-tranferrin being sent back to maternal circulation. Apo-transferrin from foetal side of the placenta is the binding site for free iron which was received from the maternal side after which the terminal product i.e. holo-transferrin is released into foetal circulation. This in short summarily describes the stringently regulated transport of iron to the foetus. A poor maternal iron status warrants an increase in placental transferrin receptor in order for more iron to be taken up by the placenta. As a system of checks and balances to ensure that the foetal placenta is not overloaded with iron excessive transport is restricted by placental synthesis of ferritin.[12]

Pregnant women being the hardest-hit victim of the deleterious effects of anaemia is the prevalent belief that provides impetus to the concept of perinatal mortality and morbidity. Deficient maternal iron negatively impacts many natal parameters, one of them being increased risk of premature birth. Consequently, these preterm infants turn out to be dangerously susceptible to perinatal complications, not to mention other debilitating effects like growth stunting, low iron stores and nutrient deficiency.[12]

Glaring extremes characterize data pertaining to maternal mortality in selected developing countries ranging from a low of 27 (India) to as high as 194 (Pakistan) deaths per 100,000 live births. Evidence, though a retrospective outcome of an observational study establishing relation between maternal haemoglobin concentration at or near delivery and possible related mortality, does point out to a possible association between increased risk of maternal mortality and severe anaemia. Counter intuitively it could be argued that such retrospective observations don't provide a solid basis for conclusive evidence that anaemia indeed plays a causal role in maternal mortality. Evidence in fact has emerged that provides authentication to the contrarian view. As an example to cite, a large Indonesian study, data revealed mortality rate of 70 per 100,000 deliveries for women with haemoglobin concentration less than 10gram/dl against a figure of 19.7 per 100,000 deliveries for women who were non anaemic.

We have also been found wanting when it comes to authentic information pertaining to the rates and severity of infection in pregnant women who are anaemic but iron deficiency was definitely associated with lower lymphocyte stimulation indices and supplementation of iron proved to be a boon in that it resulted in large scale improvement in lymphocyte stimulation in severely anaemic pregnant Indian women. In a nut shell, we do need to conduct additional studies which successfully and conclusively establish the link between iron supplementation and parameters of immune function.[12]

That India has been plagued by this morbid disease since time immemorial is common knowledge but what has been done so far to tackle and resolve the problem is what should be the focus of attention for both the government and health care providers alike. The National Nutritional Anaemia Prophylaxis Programme (NNAPP) initiated in 1970 has proved to be the pivot around which concerted government efforts towards controlling this avoidable cause of public health problem have revolved. Supplementation of iron and folic acid tablets has been both the highlight and the mainstay of the program with focussed insistence on consumption of a minimum of 100 IFA tablets.[5] A priority parameter pertaining to the goal of reduction in maternal mortality happens to be one of the listed targets in the UN Sustainable Development Goals (SDG) framework. A maternal mortality ratio of less than 70 per 100,000 live births by 2030 is the stated objective of the 3^{rd} Sustainable Development Goals (SDG).[13] To provide some quantitative perspective about the situation at hand, an intake of 100mg of elemental iron with 500mg of folic acid tablets in the 2^{nd} half of the pregnancy for at least 100 days has been recommended by Ministry of Health, Government of India.[14]

2. Aims and Objectives

To study the prevalence of anaemia in pregnant women and the factors contributing to it in the population of Vijayapur district.

3. Materials and Methods

It will be a cross sectional study to be conducted in a Tertiary care Centre at Vijayapur, North Karnataka. Institutional ethical clearance will be taken before the study. Intervention will be done wherever applicable.

3.1. Inclusion criteria

All the consenting pregnant women who meet the following will be included in the study:

1. 20-40 years of age.
2. Gestational age of >37 weeks.

3.2. Exclusion criteria

Any pregnant women with a history of following:

1. Blood transfusion and intravenous iron therapy during pregnancy.
2. Patients with known medical disorders like hypertension, diabetes mellitus, cardiac disorders etc.

Sample size - With 95% confidence level, margin of error of ± 7.5% a sample size of 146 (≈150) subjects will allow the study of anemia in pregnancy and associated risk factors with finite population correction.

By using the formula:

$N = z^2p(1-p) / D^2$

Where,

Z = z statistic at 5% level of significance

3.3. Is margin of error

3.4. Is anticipated prevalence rate

Data collection - The pregnant women visiting the hospital within the given study period for routine antenatal checkups will be taken as the source. An informed consent will be taken from the patient before proceeding towards data collection. Details of the women including age, obstetric score, number of antenatal visits, age at 1^{st} pregnancy, interval between pregnancies, residence (rural/urban), socio-economic status, literacy level, type of family, occupation, diet etc. will be collected. Under aseptic precautions 2ml of blood sample will be taken in an EDTA vaccutioner and analyzed in the Pathology lab for a Compete blood count using an Automated 5-part hematology analyzer (Sysmex XN-1000). A Hemoglobin level less than 11 g/dl will be considered as anemia and classified further into mild (10-10.9 g/dl), moderate (7-9.9 g/dl) and severe (<7 g/dl) as per the WHO criteria.[1]

Data analysis - Data will be represented using Mean ± SD, and analyzed by chi square test for association, comparison of means using t test, ANOVA correlational analysis and diagrammatic representation.

4. Results

According to the Age of pregnant females in this study, 4% were under age of 20 years in which 50% were non anaemic, 16.6% were mild anaemic, 33.3% were moderately anaemic. 57.3% were in the age group of 21-24 years in which 67.4% were non anaemic, 13.9% were mild anaemic, 17.4% were moderately anaemic, 1.1% were severely anaemic. 27.3% were in the age group of 25-29 years in which 65.8% were non anaemic, 12.1% were mild anaemic, 21.9% were moderately anaemic. 11.3% were in the age group of 30-35 years in which 70.5% were non anaemic, 11.7% were mild anaemic, 17.6% were moderately anaemic. (Figure 1)

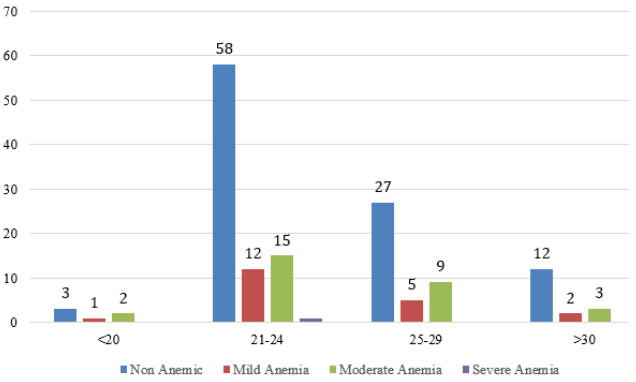

Figure 1: Different age groups

According to Obstetric score, 38% were primigravida in which 66.6% were non anaemic, 14% were mild anaemic, 19.2% were moderately anaemic. 62% were multigravida in which 66.6% were non anaemic, 12.9% were mild anaemic, 19.3% were moderately anaemic, 1% were severely anaemic. 40.7% were nulliparous in which 67.2% were non anaemic, 14.7% were mild anaemic, 18% were moderately anaemic. 56% were having 1-2 parity in which 67.8% were non anaemic, 11.9% were mild anaemic, 19% were moderately anaemic, 1.1% were severely anaemic. 3.3% were multiparous in which 40% were non anaemic, 20% were mild anaemic, 40% were moderately anaemic. 56% had living children in which 66.6% were non anaemic, 11.9% were mild anaemic, 20.2% were moderately anaemic, 1.1% were severely anaemic. 5.3% had undergone abortions previously in which 75% were non anaemic, 12.5% were mild anaemic, 12.5% were moderately anaemic. Children of 6% pregnant females had died after birth in which 66.6% females were non anaemic, 22.2% were mild anaemic, 11.1% were moderately anaemic.(Figure 2)

According to Literacy levels, 24.7% were illiterate in which 59.4% were non anaemic, 21.6% were mild anaemic, 18.9% were moderately anaemic. 20% studied till 7^{th} Std. in which 80% were on anaemic, 3.3% were mild

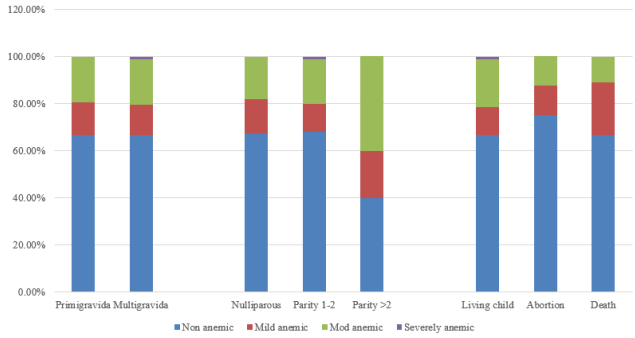

Figure 2: Obstetricscore

anaemic, 16.6% were moderately anaemic. 28.7% studied till 10^{th} Std. in which 62.7% were non anaemic, 11.6% were mild anaemic, 23.2% were moderately anaemic, 2.3% were severely anaemic. 14% studied till 12^{th} Std. in which 80.9% were non anaemic, 4.7% were mild anaemic, 14.2% were moderately anaemic. 12.7% were graduates in which 52.6% were non anaemic, 26.3% were mild anaemic, 21% were moderately anaemic.

According to the Type of occupation, 4% were involved in business in which 66.6% were non anaemic, 33.3% were moderately anaemic. 22.7% were farmer in which 67.6% were non anaemic, 11.7% were mild anaemic, 20.5% were moderately anaemic. 3.3% were involved in Govt job in which 60% were non anaemic, 40% were mild anaemic. 64.7% were housewife in which 68% were non anaemic, 13.4% were mild anaemic, 17.5% were moderately anaemic, 1% were severely anaemic. 1.3% were involved in private jobs in which 50% were mild anaemic, 50% were moderately anaemic. 1.3% were students in which 100% were moderately anaemic.(Figure 3)

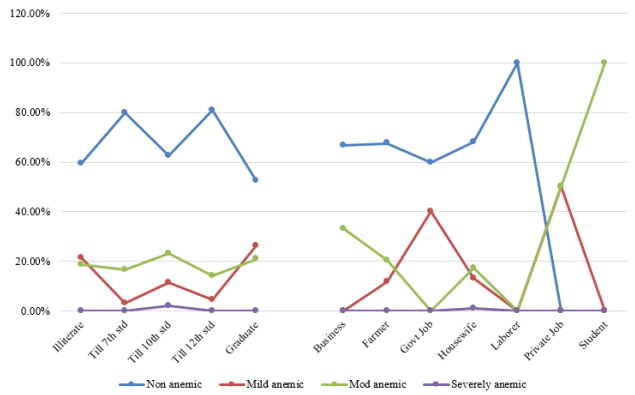

Figure 3: Literacy levels and occupation

According to Type of family 63.3% were living in joint family in which 69.4% were non anaemic, 11.5% were mild anaemic, 18.9% were moderately anaemic. 36.7% were living in nuclear family in which 61.8% were non anaemic,

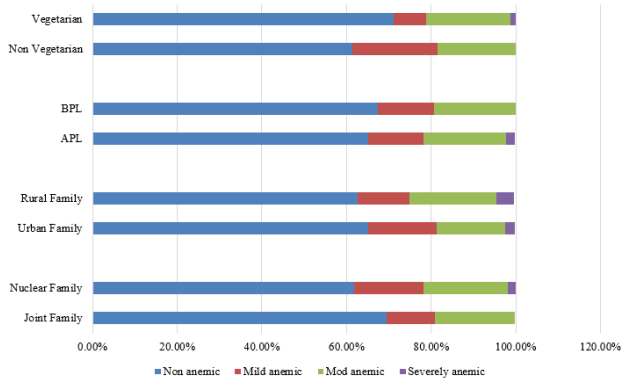

Figure 4: Types of family

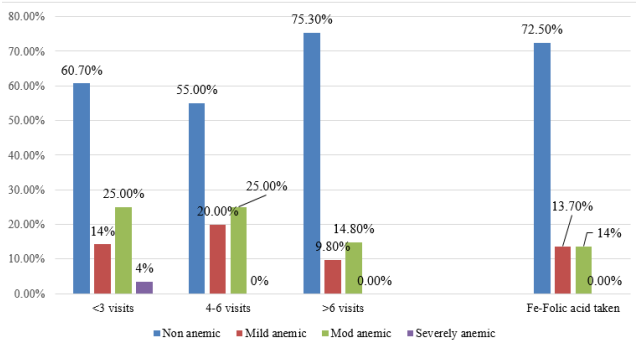

Figure 5: Total Antenatal visits and Fe & Folic acid medication

16.3% were mild anaemic, 20% were moderately anaemic, 1.8% were severely anaemic.

According to Type of residence, 71.3% were living in rural areas in which 62.7% were non anaemic, 12.1% were mild anaemic, 20.5% were moderately anaemic. 28.7% were living in urban areas in which 65.1% were non anaemic, 16.2% were mild anaemic, 16.2% were moderately anaemic, 2.3% were severely anaemic.

According to Diet pattern, 46.7% were non vegetarian in which 61.4% were non anaemic, 20% were mild anaemic, 18.5% were moderately anaemic. 53.3% were vegetarian in which 71.2% were non anaemic, 7.5% were mild anaemic, 20% were moderately anaemic, 1.2% were severely anaemic.(Figure 4)

According to Family income, 30.7% belonged to APL in which 65.2% were non anaemic, 13.0% were mild anaemic, 19.5% were moderately anaemic, 2.1% were severely anaemic. 69.3% belonged to BPL in which 67.3% were non anaemic, 13.4% were mild anaemic, 19.2% were moderately anaemic.

According to the Number of Antenatal visits, 18.7% had less than 3 visits in which 60.7% were non anaemic, 14.2% were mild anaemic, 25% were moderately anaemic, 3.5% were severely anaemic. 26.7% had 4 to 6 visits in which 55% were non anaemic, 20% were mild anaemic, 25% were

Table 1: Comparing Age Group, Socio-economic status, Residence and Iron and Folic acid medication taken in pregnant women with other studies were found dissimilar as shown in the table.

Parameters	**Non-anaemic**				**Mild anaemic**				**Moderately anaemic**				**Severely anaemic**			
1. Age group (yrs)	**<20**	**20-24**	**25-29**	**>30**	**<20**	**20-24**	**25-29**	**>30**	**<20**	**20-24**	**25-29**	**>30**	**<20**	**20-24**	**25-29**	**>30**
My study	50	67.4	65.8	70.5	16.6	13.9	12.1	11.7	33.3	17.4	21.9	17.6	0	1.1	0	0
Mangla M et al.[2]	4.6	2.1	1.7	1.6	18.4	61.3	45.6	20.8	12.3	24.7	48	34.4	64.6	9.3	3.7	32.8
Seema BN et al.[1]	17.5	20.4	20.6	22.5	22.9	18.7	15.8	11.2	45	48.3	45	44.9	13.1	10.8	15.3	14.6
2. Residence	**Rural**		**Urban**		**Rural**		**Urban**		**Rural**		**Urban**		**Rural**		**Urban**	
My study	67.2		65.1		12.1		16.2		20.5		16.2		0		2.3	
Seema BN et al.[1]	21.1		19.9		23		22.9		49.2		52.1		6.7		4.8	
3. Socio-economic status	**APL**		**BPL**		**APL**		**BPL**		**APL**		**BPL**		**APL**		**BPL**	
My study	65.2		67.3		13		.13.4		19.5		19.2		2.1		0	
Seema BN et al.[1]	20.6		21		23.9		22.6		50.4		49.2		5.1		6.5	
4. Fe-folic acid tablets																
My study	72.5				13.7				13.7				0			
Mangla M et al.[2]	7.2				44.7				40.8				7.2			

Table 2: Comparison of Educational Status with other studies was found approximately similar which is shown.

	Non-Anaemic (%)		**Mild Anaemic (%)**		**Moderately Anaemic (%)**		**Severely anaemic (%)**	
Literacy Level	**Illiterate**	**Primary Level**	**Illiterate**	**Primary Level**	**Illiterate**	**Primary Level**	**Illiterate**	**Primary Level**
My Study	59.4	80	21.6	3.3	18.9	16.6	0	0
Mangla M et al.[2]	1.1	3.6	22.9	26.8	31.8	38.1	29.6	30.3
Rajamouli J et al.[10]	–	–	20.3	5.7	22.2	15.9	3.8	1.9
Seema BN et al.[1]	20.9	18.6	18.3	23	52.9	53.6	7.8	4.6

Table 3: According to Occupation, comparison among Housewives shows different results indifferent studies as shown.

	Non-Anaemic (%)	**Mild Anaemic (%)**	**Moderately Anaemic (%)**	**Severely Anaemic (%)**
My Study	68	13.4	17.5	1
Rajamouli J et al.[10]	——	39.4	49.6	7.6

Table 4: According to the Type of Diet, comparison with other studies was found to bedissimilar which are shown.

	Non-Anaemic (%)		**Mild Anaemic (%)**		**Moderately Anaemic (%)**		**Severely Anaemic (%)**	
Type of Diet	**Veg**	**Non-Veg**	**Veg**	**Non-Veg**	**Veg**	**Non-Veg**	**Veg**	**Non-Veg**
My Study	71.2	61.4	7.5	20	20	18.5	1.2	0
Rajamouli J et al.[10]	23	18.5	22.6	7.43	14.1	8.9	3.3	1.8

Table 5: According to Number of Antenatal visits, comparison with other studies were found to bedifferent which are shown.

	Non-Anaemic (%)			**Mild Anaemic (%)**			**Moderately Anaemic (%)**			**Severely Anaemic (%)**		
No. of Antenatal Visits	<3	4-6	>6	<3	4-6	>6	<3	4-6	>6	<3	4-6	>6
My Study	60.7	55	75.3	14.2	20	9.8	25	25	14.8	3.5	0	0
Mangla M et al.[2]	0.4	2.4	6.4	51.4	5.5	40.1	26.4	61.9	40.1	17.1	30.1	50.8

moderately anaemic. 54% had more than 6 visits in which in which 75.3% were non anaemic, 9.8% were mild anaemic, 14.8% were moderately anaemic.

According to Iron and Folic acid medication, 82.7% took the full course of medication in which 72.5% were non anaemic, 13.7% were mild anaemic, 13.7% were moderately anaemic.(Figure 5)

5. Discussion

In this study, we categorized the pregnant women according to various parameters.

Iron deficiency anaemia seems to have a special predilection for India as it accounts for women belonging to reproductive age group (15-49 years), children (6-35 months) and population belonging to low socio-economic strata with equal propensity. Data analysis for states plagued with anaemia in which at least 70% children were anaemic, revealed that barring Punjab, the prevalence of anaemia in pregnant women exceeded 50% in all other states.(Tables 1, 2, 3, 4 and 5)

Iron supplementation proving to be an ameliorating factor in situations where maternal iron status was dismal has been established by innumerable studies. Therefore, it is only pragmatic and imperative that we define the dosage of such supplementation for mothers which may be sufficient for nipping the problems of possible complications like abortions, pre mature birth, post-partum haemorrhage and low birth weight in the bud.[15–18] To put it into perspective The National Nutritional Anaemia Prophylaxis Programme (NNAPP) instituted by the Government of India as part of the 4^{th} Five year plan with a stated objective of prevention of mild and moderate cases of anaemia via iron and folic acid supplementation was put into force. It recommends 1 tablet of iron and folic acid having 100 mg of elemental iron (300 mg of ferrous sulphate) and 0.5 mg of folic acid should be administered daily with a continuation period of 2-3 months so that normalcy in haemoglobin level is obtained and replenishment of iron stores is effected.[19]

A study conducted in National Institute of Nutrition Hyderabad found that ferric orthophosphate or ferrous sulphate when added to sodium bisulphate was enough to fortify salt with iron.[20]

6. Conclusion

The main parameters leading to anaemia were found to be socioeconomic status, literacy level of the mother, gravida score, birth spacing interval and iron-folic acid medications. This high prevalence of anaemia is a strong indicator of failure of the healthcare system of our country. To combat this situation, there is an urgent need to modify our healthcare system starting from health education, awareness programmes, increased frequency of anaganwadi worker visits, promoting cooking of food in iron utensils, food fortification, antenatal check-ups every month by trained practitioners, birth control, promotion of family planning, reducing the burden of malaria and worm infesations, providing proper balanced diet to the mother with food supplements and iron-folic acid medications with a good compliance.

7. Source of Funding

None.

8. Conflict of Interest

None.

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Author biography

Prakash M Patil, Professor

Neelamma G Patil, Professor

Naqsh Thakur, Post Graduate Student

Shrey Kumar, Medical Officer

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