Ante Natal Care and Low Hemoglobin at Delivery; Significant Factors for low birth deliveries in Tharparkar District of Sindh Province, Pakistan, 2017-18: A Case Control Study

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ABSTRACT

Ante Natal Care and Low Hemoglobin Level at the Time of Delivery; Significant factors for low birth deliveries in Tharparkar District of Sindh Province, Pakistan, 2017-18: A Case Control Study

Introduction:

Tharparkar is very hard dynamically and remote areas of the province. The hemoglobin level of the mother has major impact and causal relationship with the birth weight of the neonates .This is very first study of its type in the region to address old issue of region.

Methodology:

A case control conducted in Tharparkar district. The cases were women who gave birth to the neonates with LBW ie less than 2500g. The controls, the women who delivered babies with normal birth weight, were taken from same hospital in 1; 1. The data was collected by closed ended tool and checked for completeness and consistency. The outcome was assessed by the odds ratio and reported at 95 % CI with error of margin 5%.

Results:

Total 187 deliveries with the neonates born with LBW were identified (mean birth weight-1600 g with SD +/- 0.45 g). The preterm deliveries were 49% (n=103), highest number occurred in 25-28 weeks of pregnancy 26% (n=53). The Antenatal Care was taken in 17% (n=36) of the pregnant women in cases (76% in controls). The mean hemoglobin of cases were 7.7 mg/dl (standard deviation= +/- 1.5) whereas mean hemoglobin level of controls was 10 mg/dl (standard deviation= +/- 2.5). Odds of delivering LBW neonates were 11 (CI 6-18, P value <0.00) in anemic mothers whereas Utilizing antenatal care was found to be protective against delivering a neonates with LBW (OR 0.06, CI 0.04-0.1, P value <0.00).

Conclusion:

The study determined that antenatal care and low hemoglobin level are significantly associated with LBW.

Key Words;

Tharparakar, Low Birth Weight, Antenatal Care, Hemoglobin, 2017/18

1 Introduction:

Low birth weight is universally accepted as predictor for the neonatal morbidity as well as mortality and has major noxious effect on the future life of the neonate[1]. There are many factor affecting the birth weight of neonates among which underutilization of ante natal care is also included.

Ante natal care is documented as one among four pillars of the safe mother hood and healthy pregnancy outcome[2]. The ante natal care is among the cost effective strategy for preventing the maternal and neonatal complication in under developing countries[3]. With the utilization of antenatal care women are regularly checked for the danger signs which can affect the pregnancy notoriously. Therefore the antenatal care system strengthening is very much important for the wellbeing of the pregnant women as well as the neonates. More over the studied have proved that the ante natal care by skilled person can obtain success in advancing the neonatal survival in the countries with very weak health system[4].

Globally 16% babies are born with low birth weight (<2.5 kg), of which 19% in the under developed countries and developing countries and 7% in the developed countries. The frequencies of LBW is 31% in South Asia, 15% in Middle East and North Africa and 14% Sub-Saharan Africa[5]. Nevertheless the low birth could have been prevented by the provision of very cost effective ante natal care to pregnant women due to fact that the ante natal care affect the neonatal mortality via its positive effect on the birth weight[6].

Pakistan is sixth most populous, under developing country of the world, having high maternal, Perinat and neonatal mortality rate[7]. According to Pakistan Demographic and Health Survey (PDHS 1813-14) 30% women living in rural areas of the country had had no antenatal care utilization during the pregnancies in last five years[8].

Tharparkar district is rural and administratively neglected district of Pakistan, with lack of health infrastructure and basic health facilities[9]. The population of the district is 0.9 million according to 1998 census[10], but current estimated population is 1.3 million. The utilization of the ante natal care in the district is 29%, which is far below the national

data[11]. The low birth weight, high children mortality and malnutrition are concurrent health problem in the district. There are many factors associated with these condition but these have never been studied in the past, probably due to geographical harshness and remoteness of the area. Ultimately the policy makers and mangers are lacking the evidence based information for the proper allocation of funds and resources in the area despite being the fact that country has been facing shortage of resources. Therefore it was hypothesized that the ante natal care utilization could be taken as a cost effective measure among many others to address the issue of low birth weight in the district. This is very first study of its type in the region, which is aimed to address the centuries old issue of the Tharparkar. Moreover it is aimed to better guide the policy makers and fund managers for effective utilization of resources for the maximum benefits.

1.1 Aim & Objectives

1.1.1 The Aim of the study

- The study was aimed to know the effect of the antenatal care utilization on the birth weight of the neonates during 1st October 2017 to 28th February 2018.

1.1.2 The Objectives of the study

The objectives of the study were:

- To identify the effect of the Ante Natal Care and Hemoglobin level at the time of delivery take on the birth weight of the neonates.

1.2 The Research question

What are the effect of antenatal care taken by mother during pregnancy and low hemoglobin level at the time of delivery on low birth weight of coming neonates in Tharparkar district of Sindh, Pakistan?

The hypothesis being tested was that; Do the pre delivery factors like ANC taken and low hemoglobin level have any effect on the birth weight of the coming neonates or not.

HO: Utilization of adequate Ante natal Care and hemoglobin level do not have any effect on the birth weight of the neonates

HA: Utilization of adequate Ante natal Care and low hemoglobin level have major effect on the birth weight of the neonate

2 Literature Review

Malnutrition is very prevalent in Tharparkar [12] due to remote ness of the area and disperse kind of the resources. There is no sources of income in the area except the live stocks and agriculture, but unfortunately both of these sources are rain dependent [13]. Rain is the life for the people of the area but due to environmental changes the area is facing consistent droughts repeatedly and since 1968 the area has witnessed 13 droughts affecting the area partly or fully [14]. Moreover Tharparkar district is only district of the Pakistan which was found to be more food insecure and less in human development index [15].

Since years it is well documented that the lack of the ante natal care is always associated with bad pregnancy out comes like preterm birth, low birth weight babies and low Apgar score at the time of the delivery [16]. The ante natal care is the service by which the pregnant is given a care which focuses on the indicators for the healthy outcome of the neonate. In comparative studies it was presumed that the delivery outcome were better in the women who had high hemoglobin level than those who had

low hemoglobin level during pregnancy, where the hemoglobin level were taken as an independent risk factor for the pregnancy outcomes [17].

In Pakistan the health has always been very weak department due to lack of the resources and accessibilities to health care provider, as is evident form the literature review, that the government of Pakistan is spending less than 1% on health which is very low when comparing with the immediate neighboring countries [18]. The health care service utilization were not studies well in the country as it were in other developing countries. The situation are graver in the rural area and especially in the areas which are remote and dynamically hard like Tharparkar. In a study on utilization of MCH services in the Tharparkar revealed that only 17% women sought ante natal care from government hospitals while only 2% of deliveries were assisted by the trained birth attendant [19]. Where as in one study done in Tharparkar cumulative utilization of ante natal care was found to be 29% only [20]. In another study done in the Tharparkar district showed a severe shortage of the lady doctors and gynecologist in district [21].

Due to lack of the antenatal care the hemoglobin level of pregnant women are going un checked in the Tharparkar region of the country. Although it is proved that women are more cautious towards their sibling and adherence to the supplementation being provided by the health care providers are also high among the women who are at risk of low hemoglobin diseases but unfortunately the cycle is repeating itself perhaps due to the policies and government will [22]. Lack of utilization of maternal and child health (MCH) services are among the major challenge throughout number of low as well as middle income countries. Due to low utilization of MCH services, progress towards the Millennium Development Goals (MDGs) has also been stretched seriously in these countries like Pakistan [23]. Due to the fact of rural customs, culture, male dominancy and taboos the utilization of the ante natal care services are very low, only 29% in Tharparkar documented by a study done in the country [24]. There is need of strengthening the system of the of the maternal and child health in the district with proper fund resources through public private partnership [25]. More over further studies and research are needed to address the issues properly to better guide the policies for the good will of the people of Tharparkar. However other approaches, especially

prospective studies as well as qualitative research methods, are also needed for the better understanding of the factors associated with low birth deliveries in the region.

3 Methodology

3.1 Study setting

The study was conducted in Tharparkar, one of the remote districts of Sindh province, Pakistan. The hospitals chosen were Civil Hospital Mithi, Green Star Maternity Home Mithi, Taluka Hospitals of four talukas of the district, Rural Health Centre Bhakuao, Kot Arbab Mir Mohammad and Kaloi. These are government run MNCH Center operating in the district. All these centers work on 24/7 basis.

3.2 Study Period

The study was conducted from October 2017-February 2018

3.3 Target Population

Women who delivered a live baby, irrespective of the mode of deliveries, with neonates having low birth weight.

3.4 Inclusion Criteria

Those women, whose family were permanent residence of the Tharparkar (i.e. living from January 1815 to date in the Tharparkar), delivered a singleton live baby with low birth weight were included in the study as cases.

3.5 Exclusion Criteria

The post term pregnancy, mothers who have moved to Tharparkar recently (after the January 2015) mothers having any comorbid illness and twin pregnancies were not included in the study.

3.6 Study design and sample size

A case control study was conducted from October 2017 to February 2018. All the deliveries which taken place at the designated hospitals were taken in the study. The controls were also taken from same hospital in 1; 1 frequency. The controls were matched to cases by age and locality.

Sample size was calculated using the method of Schlesselman for an unmatched case–control study [26] to detect the odds ratio (OR) of 2.0, power of 80%, specifying alpha at 5% with 17% prevalence of antenatal care (ANC) in the country [14] and estimating the non-responders at 10%.

3.7 Sampling Method

The sample were taken from the district government hospitals, 3 private hospitals and 1 maternity home of the district, on prescribed format.

3.8 Data Collection

The data was collected using interview method by pre structured questionnaire. The questionnaire was prepared in English. The questionnaires had socio-demographic information of mothers and factors that are in turn affecting the weight of the babies. The demographic variable were age, occupation, monthly income, literacy level, mode of delivery, number of children etc. The data was collected by the trained staff of the concerned hospital which were trained to collect data on questionnaire by the principal investigator.

3.9 Data Analysis

The data was checked for completeness, consistency and was cleaned manually. It was entered in statistical software (EPI INFO) version 7.0. Findings were presented in the form of tables and graphs. The risk of having a neonates with low birth weight was assessed by the odds ratio. Results were reported at 95 % Confidence Intervals (CIs) with error of margin 5%.

3.10 Operational Definitions

Low Birth Weight

According to WHO normal birth weight is 2500g or 2.5 kg. Any child delivered less than this cut off was taken as Low Birth Weight neonate [27].

Normal Term Pregnancy;

According to WHO the pregnancies of >37 weeks are considered as normal term pregnancies. Any pregnancy ending before these duration should be considered as pre term deliveries [28].

Normal Hemoglobin level.

According to WHO the normal hemoglobin of a pregnant women is 14-18 g/dl, whereas hemoglobin level less than 11 should be considered as anemia during pregnancy [29,30].

Ante Natal Care.

According to WHO every pregnant women should at least undergo 4 hospital visits from the start of pregnancy to the delivery of neonate [31].

3.11 Ethical Clearance

Permission was taken from District Health Office Tharparkar. Verbal consent was taken from all mothers who participating in the study. Confidentiality and anonymity of the study participants were truly maintained.

4 RESULTS:

4.1 Descriptive Statistics

Total 187 deliveries with the neonates born with low birth weight were identified with mean low birth weight was 1.6 with standard deviation of +/- 0.45. Of these 187 neonates the female neonates were 70% (n=144) and male neonates were 30% (n=63) [Figure1].

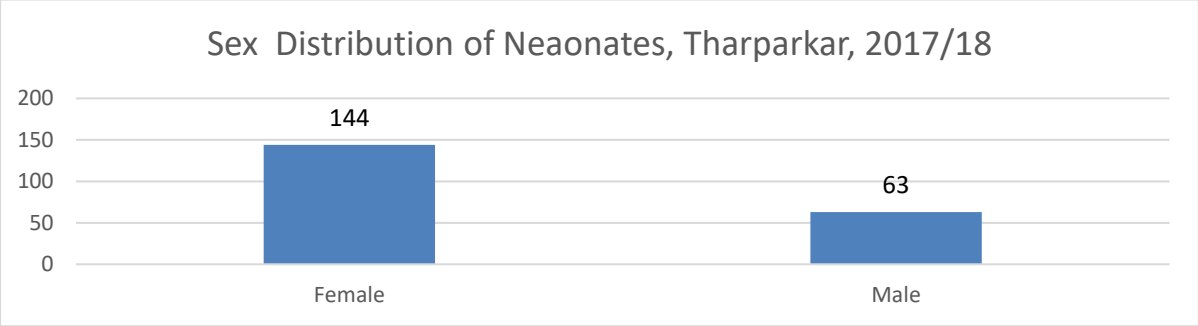

Figure 1. Number of Male and Female Neonates born

The preterm deliveries were found in 49% (n=103) of which highest number of preterm deliveries occurred in 25-28 weeks of pregnancy 26% (n=53), whereas 51% (n=104) were term deliveries.

Term of Pregnancy (n=187)	Count	Percentage
21-24 weeks	25	12%
25-28 weeks	14	6%
29-32 weeks	53	26%
32-36 weeks	11	5%
37-40 weeks	104	51%

Table 1. Frequency of Term of Delivery at Tharparkar, 2017-2018

The Antenatal Care was taken in 17% (n=36) of the pregnant women, who gave birth to low birth weight babies, however complete 4 ANC visit were not taken by any women. The highest number of ANC was provided by the LHV/ Nurse 67% (n=24) whereas

lowest number of ANC was provided by the medical doctors 33% (n=12). In those women who gave birth to normal birth weight babies the ANC was taken by 76% of women (n=160).

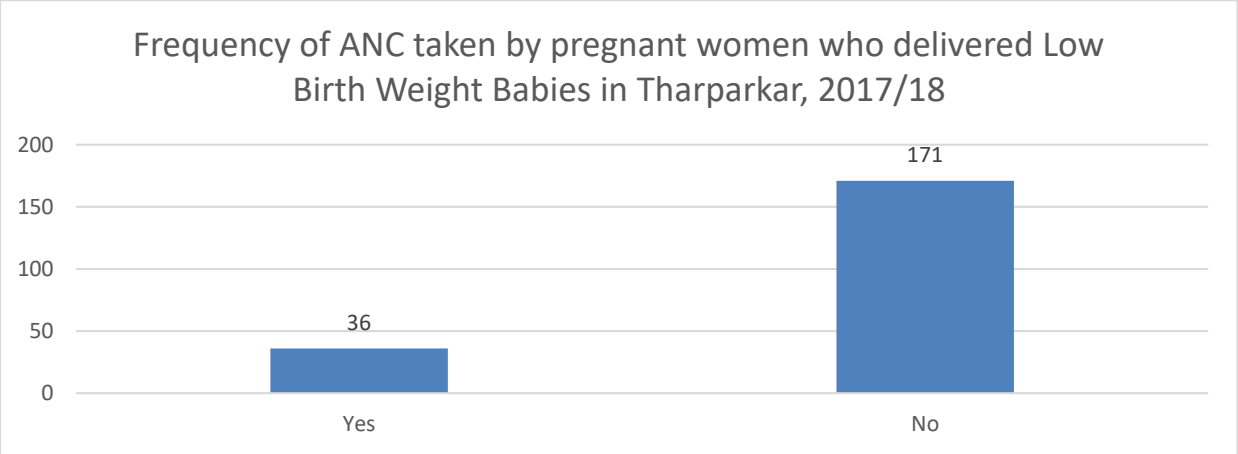

Figure 2. Frequency of ANC Taken by Women

ANC Taken	Count	
	Cases	Controls
Yes	36	160
No	171	50

Table 2. Frequency of ANC Taken by Cases and Control at Tharparkar, 2017-18

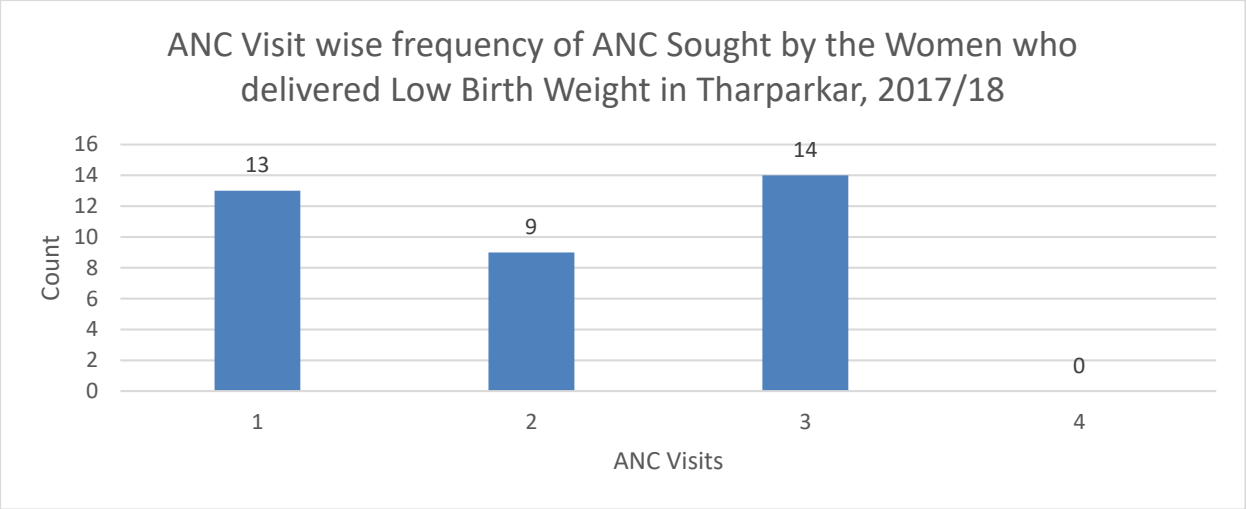

Figure 3. Frequency of ANC Visit Taken by Women

The mean hemoglobin of the women who delivered low birth weight neonates were found to be 7.7 mg/dl with standard deviation of +/- 1.5 whereas mean hemoglobin level of the mothers who gave birth to normal weight babies was 10 mg/dl with standard deviation of +/- 2.5.

Mean Hemoglobin Level	**Cases**	**7.7 mg/dl**
	Controls	**10 mg/dl**

Table 3. Frequency of Mean Hemoglobin level of mother's

5 ANALYTICAL RESULTS:

The odds were calculated for the having low birth weight neonates related to low hemoglobin level less than 11 mg/dl at the time of delivery and Antenatal Care taken by the mother for at least one time before the delivery.

Odds of delivering low birth weight neonates were found to be 11 (CI 6-18, P value <0.00) times more in those mothers whose hemoglobin was less than 11mg/dl as compared to the mothers whose hemoglobin levels were more than 11 mg/dl.

Utilizing antenatal care was found to be protective against getting a neonates with low birth weight. Odds of getting a neonates with low birth weight was 0.06 (CI 0.04-0.1, P value <0.00) in the women who took antenatal care as compared to those who had not taken any antenatal care during the pregnancy.

6 DISCUSSION:

Tharparkar is among 29 district of the Sindh. It is very hard dynamically and remote areas of the province. The population of the district is 0.9 million according to 1998 census [32], but current estimated population is 1.3 million. Administratively Tharparkar district consists of six (6) Talukas (sub districts): Mithi, Diplo, Islamkot, Nangarparkar, Chachoro and Dahli and has 44 Union Councils with more than 166 Dehs (large villages) with more than 1800 hamlets [33].

Tharparkar district is administratively neglected district of Pakistan, with lack of health infrastructure and basic health facilities [34]. The dynamics of Tharparkar are very hard as it takes 2-6 hours to reach a nearby health facility, with a cost of 1000-6000 Pakistani rupees by each patient who hardly earns 4391 ($42) every month [35]. However the motivation behind this study is to quantify the effect of measureable factors on low birth weight in Tharparkar, starting from the six public hospitals and two private hospitals available for the general public in the district. This study provides raw information from the dune of Tharparkar which are very hard to reach and a start to debate low birthweight from region, which could help with possible intervention regarding maternal and newborn health in the future. Moreover there are other hospitals in the district which could have been included in the study but first they were not willing and secondly most important it was beyond the sources of the researcher. In a survey conducted in 1812-1813 the low birth weight was found very high in Tharparkar, So there is a need to conduct studies to evaluate the risk factors affecting birth weight of neonates in the region.

This study, being first of its type in the district, was aimed to find out the effect of ante natal care and hemoglobin level of women on the birth weight of the neonates among deliveries conducted at Tharparkar. The study includes interviews based on a pre-structured questionnaire regarding the effect of these factors on birth weight of neonates among deliveries at Tharparkar. The information was extracted through closed-ended questionnaire. The socio-demographic characteristics of women, the utilization of ante natal care during the current pregnancy and hemoglobin level at the time of the deliveries were sought in this study. In addition to it, effect of these factors on the birth weight were evaluated. It was found that the ante natal care utilization was a protective factor against the low birth weight deliveries of the neonates and hemoglobin was also found to be the protective factors against the low birth weight delivery of neonate.

In this study, the Case Control study design was selected, because Case Control design provides easy calculation of factors at a very limited resources. There are no previous quantitative studies on these factors in Tharparkar. Therefore, it seemed very suitable to focus on risk quantification and association. The present study can be useful in the future for further research studies focusing on low birth weight deliveries to work out possible improvement and interventions (policy and preventive programs). This study can moreover provide some statistics about importance of antenatal care and hemoglobin levels of the women and birth weight of neonates, which can help policy makers to revise their policies in the light of these study findings. As, most of the studies mentioned in literature were conducted in the developed world, a similar study in the developing country like Pakistan will be beneficial for comparison of the results.

In this study, we took cases as well as controls from 10 different hospitals e.g. DHQH, 4 THQs, 3 RHCs and 2 Private MCHC Centers, so that the study results can better be generalized to whole district Tharparkar as well as country.

In a study of same setting, conducted in Karachi City of Pakistan by Lone FW, Qureshi RN, Emmanuel F showed strong association of low hemoglobin of the mothers with the low birth weight of neonates [36]. In another local study, done at Peshawar by Badshah S, Mason L, McKelvie K, Payne R, Lisboa PJ, low hemoglobin level of women were

significantly associated with the low birth weight of the neonates [37]. According to NailaBaig Ansari et al. most of the mothers (90%) in Pakistan were anemic having hemoglobin level less than 11 mg/dl in a study done in the urban areas of the country [38]. These feature are consistent with our study that mean hemoglobin level of the women were 7.7 mg/dl. Data from another study held in Nepal also showed that low hemoglobin level was significantly associated with the low birth weight [39].

Ante natal Care has long been stated as indicators for the risk assessment of pregnant women/fetus and use of the strategies to reduce the risks by means of interventions through medicine, nutrition as well as vaccination [40]. In an article published in International Journal for Quality in Health Care concluded that incidence of low birth weight deliveries could be decreased if the women utilize the adequate amount of the antenatal care [41]. The same results can be drawn from this study also which shows antenatal care is found to be protective against low birth deliveries. The work of SanniYayya and colleagues presented similar results to the current study. [42] They concluded that Antenatal care is a significant factor for to prevent the deliveries of low birth weight infants.

Malhotra, Monika, et al. found that anemia is associated with increased risk of the low birth weight [43]. According to study by Khan, Yasir P, et al. conducted in Pakistan, 96% of women pregnant women were found to be anemic especially iron deficiency. There were multiple factors associated with this picture included low socioeconomic status, less education and others [44].

7 CONCLUSION AND WAY FORWARD:

Low hemoglobin and inadequate utilization of ante natal care services are responsible for low birth weight deliveries in Tharparkar. The study determined that majority of the women who gave birth to babies with low birth weight were anemic and utilization inadequate antenatal care services. Therefore, interventions should be encouraged to incorporate helpful strategies regarding health education of women, nutrition and

importance of ante natal care for the good pregnancy outcomes, so that it can contribute towards decreasing the deliveries of babies with low birth weight. It was evident through the study that by the mean hemoglobin level of the women who gave birth to low birth weight neonates were less than those who gave birth to normal weight babies, therefore hemoglobin levels of the pregnant women should be checked regularly through proper ante natal care system in the district. Nevertheless, involving the community especially mother in laws, grandmothers and husbands in health educations for the regular checkups can also play pivotal role in encouraging proper utilization of the ante natal care practices.

There is also a need for further extensive studies to investigate effect of the hemoglobin level and ante natal care utilization on low birth weight deliveries with associated risk factors. Policies should be made to train the healthcare providers to promote, support and educate mothers during their pregnancy for the antenatal care and regular checkup of hemoglobin should be started as baseline requirement during each antenatal care visit. Training of mothers regarding awareness of antenatal checkup and schedule should be done through different channels like media and community midwives to help aware mothers through this technique.

8 Conflict of Interest:

The author declare no any conflict of Interest

9 Funding:

No any funding

10 IRB Certificate:

Since study did not incorporate any procedure or manipulation, however informed consent was taken from all the participants. The district health office allowed the study. The ERB was also approved from Provincial Disease Control and Surveillance Unit, Hyderabad, Sindh.

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