July 1995

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Pages with reference to book, From 170 To 173

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Abstract

A rapid nutritional and health evaluation of a random sample of 163 pregnant women was conducted in low socioeconomic settlements of Karachi, with the objective of determining the morbidity and nutritional status of pregnant women. These data are expected to be used in an ongoing community-based antenatal care programme. Twenty-nine percent of women reported fever, 14 percent diarrhoea and 33 percent respiratory infections in the previous week. Mean weight was 54.8 (±10.6) kg, mean height was 151.6 (±6.0) cm and mean midarm circumference was 25.6 (±3.2) cm. The mean uterine height at gestational ages 8 months and over was 32.1 (±10.2) cm which is below the 10th percentile. These results suggest a chronic, mildly malnourished population with a high rate of infections. Specifically, we suggest that maternal height and uterine height be used to assess women at high risk for low birthweight (JPMA 45:170,1995).

Introduction

Expectant mother suffering from malnutrition, acute and/or chronic illnesses are at very high risk of serious health consequences for themselves and their babies including death. In developing countries, it is estimated that maternal mortality is about 200 times higher than in developed countries and that among 111 million births, almost 19 million (17%) were low birth weight[1]. Thirteen million of these births occurred in South Asia including Pakistan, representing 25% of all births in South Asia[1]. Consequently, the magnitude of the problem is immense and needs to be addressed urgently.
Studies in developed and developing countries report the adverse effects of risk factors such as high parity, maternal malnutrition, short birth spacing, heavy work during pregnancy, anaemia, illness and some others on low birth weight[2]. The relationship of maternal anthropometric measurements such as height, weight, weight gain during pregnancy, midarm circumference and triceps skinfold thickness to low birth weight has been reported in a number of studies[3-5]. Unfortunately these reports am generally hospital-based. Women seeking antenatal care at large government hospitals am a self-selected group and may be biased against an increased risk. Korejo et al[6] reported that 60 percent of women, delivering at a large public hospital in Karachi, were un booked. Consequently, the probability of selection bias of hospital based data is high. We report on the results of a rapid community-based nutrition and health assessment of pregnant women in low socioeconomic settlements of Karachi.

Materials and Methods

Three urban squatter settlements, served by the Department of Community Health Sciences, Aga Khan

University as prototypes for primary health care (PHC) systems, were the field settings' for this population-based cross-sectional evaluation of pregnant women. Household lists including family folders containing detailed information on socioeconomic factors for all registered households were available. A team of 5 faculty members (trainers) and 20 nursing students participated in this study. All women known to be pregnant in the community either because they were registered in the PHC health clinic, reported by the traditional birth attendant or detected in the community during the survey were included. A total of 163 pregnant women were studied.

The nursing students were trained according to standard World Health Organization methodology for nutritional assessment. During the training sessions and in the field reliability, accuracy and measurement errors were compared between students and trainers. The anthropometric measurements included in our study were height, weight, triceps skin fold and mid-arm circumference. These measurements were obtained in duplicate by students but averaged for the analysis as the correlation was >0.79; P<0.0001 (Table I).

Table I. Correlation coefficient for various anthropometric measurements taken twice per woman.

Anthropometric measurements	Correlation coefficient	P value
Weight	0.953	<0.0001
Height	0.796	<0.0001
Mid-arm circumference	0.835	<0.0001
Triceps skinfolds	0.950	<0.0001
Uterine height	0.981	<0.0001

Information on socioeconomic factors such as maternal education, number of moms in the house, housing material were available from existing records; date of last menstrual period (LMP), maternal age, prenatal care and selected clinical symptoms were obtained by interview and uterine height measured with a tape measure. LMP used was the best estimate for gestational age after comparing consistency of results between LMP and reported month of gestation.

A socioeconomic index (low, middle and high) was developed based on the following six factors: maternal education, number of rooms, sources for light and water, fuel used for cooking and housing material. A score of one was given to the category with the lowest socioeconomic status. For example, maternal education was grouped into three categories with a score of! for maternal illiteracy while six or more years of education was given a score of 3. Scores which fell within one standard deviation were considered as middle socIoeconomic status (score 7-11), while those outside this range were considered low (score 1-6) and high (score 12+) respectively.

Results

Since the primary aim of this study was to assess the nutritional and morbidity status of women in pregnancy, all women known to be pregnant at the time of the survey and who could be ascertained, were included irrespective of trimester of pregnancy. A total of 163 pregnant women were studied representing most of the pregnancies expected in this community. The early detection of pregnancy is diffIcult, especially in a sample from squatter settlements with high illiteracy rates. Seventy-eight

women (50 percent) were in their third trimester, 31 percent in the second and 21 percent in the first trimester when ascertained by this survey.

Table II. Percentage distribution of socioeconomic factors among interviewed women.

Risk factors	Number	Percent
Maternal Education		
Illiterate	122	75
Literate + class 1-5	23	14
Class 6 and above	18	11
Housing material		
Kutcha-pucca	64	39
Pucca	99	61
Number of living rooms		
One room	88	54
Two or more rooms	75	46
Source of light		
Kerosene	8	5
Electricity	155	95
Souce of water		
Community tap	118	72
Tap in the house	45	28
Socioeconomic index		
Low	4	2
Middle	140	86
High	19	12

Table II shows the distributionof socioeconomic factors among 163 women interviewed. Majority of cases were illiterate (75 percent), 11% reported more than six years of schooling. Most women lived in pucca homes (61 percent) and had access to electricity (95 percent), only 28% had a water tap in the house and 54% lived in one roomed house. Using the socioeconomic index described above, only 2 percent of the sample had alow socioeconomic index, undoubtedly because of the high rate of access to electricity and the characteristics of the home construction in these three settlements sampled.

A little over half the women studied were 20-29 years of age. Mean age at first birth was 19 years and over 60 percent had their first baby by twenty years. The health status was ascertained by enquiring about respiratory infections, fever and diarrhoea in the week prior to the interview. About 29 percent

reported fever, 14 percent diarrhoea and 33 percent respiratory infections. Thirty-two percent upon examination, had edema of the lower extremity and 44 percent pallor of the conjunctiva. Despite easy accessibility to the prenatal care services provided by the Aga Khan University Primary Care Clinics inthese settlements, only 54 percent reported going for any antenatal care.

About 16.2 percent weighed less than 45 kg and nearly 10 percent were less than 145 cm tall. The mean weight, height, mid-arm circumference and triceps skin fold thickness were 54.8 kg, 151.6 cm, 25.6 cm and 16.9 mm respectively (Table III).

Table III. Mean and standard deviation (S.D.) of various anthropometric measurements.

Anthropometric measurements	Mean	S.D.	50th percentile of reference chart
Weight (kg)	54.8	10.6	60.6*
Height (cm)	151.6	6.0	163.3*
Mid-arm circum-ference (cm)	25.6	3.2	27.7**
Triceps skinfold (mm)	16.9	6.4	21.0**

Sources:

*Anthropometric reference data and prevalence of overweight. United States, 1976-80. Data from the National Health Survey Series 11, No.238.

**United States Health and Nutrition Examination Survey 1, 1971- 1974.

However, onstratyfying by gestational age, a trend was observed for uterine height and weight (Table IV).

Table IV. Mean, standard deviation (S.D.) and Inter-Quartile Range (IGR) of various anthropometric measurements with gestational age.

Gestational age		≤5 months			6-7 months			8+ months	
Anthropometric measurement	Mean	S.D.	IQR	Mean	S.D.	IQR	Mean	S.D.	IQR
Uterine height (cm)	16.0	3.7	14-18	24.3	3.4	22-26	32.1	5.2	28-36
n		25			46			69	
Triceps skinfold thickness (mm)	18.0	5.4	15-22	16.5	6.7	11-19	16.9	6.2	12-21
n		25			45			69	
Maternal weight (kg)	52.9	9.5	46-61	52.6	9.5	46-60	58.1	10.2	50-68
n		25			51			24	

Weights of pregnant women who were 5 month or less pregnant when included in the survey averaged 52.9 (±9.5)kg and women seen at 8 month or later 58.1 (±10.2). The cross sectional data for women's weight at or before 5 months and at or after 8 months suggests a mean weight gain of about five kilograms for this interval with all of the weight gain occurnng inthe last months of pregnancy. As expected, triceps skin folds had only small variations by gestational age, ranging between. 16.9(±6.2)mm to 18(+5.4)(Table IV).

Discussion

The results from our cross-sectional urban study are based upon a population which had 75 percent maternal illiteracy. Sixty-one percent lived in pucca homes and 95 percent had access to electricity. The disease burden among this population was high with reported rates of diarrhoea and respiratory infections of 14 percent and 33 percent respectively suggesting a high rate of infections. The negative relationship between maternal morbidity status and birth-weight have been shown in a number of studies[7,8].

Hagekull et al[9] reported that in an urban slum in Lahore, the mean weight at nine months of pregnancy was 61.3 (±9.4) kg while in our study the mean weight was much lower [54.8(±10.6) kg]. However, the mean height in these two communities [Lahore[9]]154.1(±5.8); Karachi 151.6(+6.0) cm are comparable. Therefore, this sample of urban low socioeconomic pregnant women is undernourished as compared to the Lahore urban women.

There is good evidence to support the independent' association between birth weight and maternal height after controlling for the potential confounding effect of gestational age, sex, pregnancy weight gain pit-pregnancy weight and other interfering variables[5,10] . The mean maternal height in our sample was 151.6cm, which is approximately .10 cm less than the NCHS standards though comparable to the Lahore study reported by Hagekull[9]. Based upon reported estimates from other studies that one additional centimeter adds about 10 gins of birth weight[5,10], in our population low maternal height alone results in a decrease in mean birth weight of about 100 gin. This leads us to suggest that maternal height be considered as a useful indicator to incorporate in a risk scale since it can be obtained at any time during pregnancy and is not affected by gestational age. The relationship of weight gain to birth weight has been studied in detail as early as the mid-1940s by Beily and Kurland[11]. In this study and considering the cross-sectional nature of the study, we estimate an average weight gain beyond 20 weeks gestation of approximately 5 kg. Several Indian authors[4,12] have reported an average gain of about 7.0 kg and a prevalence of low birth weight of about 30 percent when weightgthnwasbetween4.5 and6.5 kg[13]. The low weight gain in our population, although based upon cross-sectional data, suggests that the prevalence of low birth weight may be high. However, there is conflicting evidence from the anthropometric measurements of subcutaneous fat and upper arm muscle area. It is assumed that upper midarm circumference and triceps skin fold thickness indicate reserves of muscle protein[14] and caloric reserves stored as fat[14] respectively. -Studies have demonstrated that low calorie and protein reserves are significantly associated with foetal growth retardation[15].

The mean mid-arm circumference and triceps skin fold thickness suggests that these women are mil4ly malnourished as these values fall approximately in the 25th percentile range when compared to white females of similar age[16], thus implying that the prevalence of low birth weight may not be as high as described for an Indian population[13].

Various studies have demonstrated that uterine height is a good screening method for detection of growth retarded foetuses[17,18]. Belizan et al.[17] reported that of 44 babies born with low birth weight, 86 percent hadutenne heights below the 10th percentile. The mean uterine height for gestational age of & months and over (Table IV) was below the 10th percentile of the data reported by Belizan et al. [17] implying that the poor total growth is a public health problem in the Pakistani community studied.

In summary, the data are compatible with a chronic, mildly malnourished population of low stature, moderate arm muscle size and a high prevalence of diarrlxea and respiratory infections. The results demonstrate that a field-based, rapid nutritional and morbidity evaluation can easily be conducted to ascertain the health status of pregnant women. The data suggest that information on nutritional status can be used for identifying high risk sub-groups and for establishing health priorities. We suggest that stature and uterine height be used as simple tools for field-based assessments of women who are likely to give birth to low birth weight babies.

Acknowledgements

I appreciate and acknowledge the nursing students and faculty of The Aga Khan University School of Nursing for their valuable support and contribution to data gathering. Support for thi study was provided by research grant SFCP 08-024-N.

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