MATERNAL RISK FACTORS AS DETERMINANTS OF LOW BIRTH WEIGHT AMONG ARMED FORCES FAMILIES

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ABSTRACT

Low birth weight (LBW) is responsible for a significant proportion of child morbidity and mortality apart from its possible role in the occurrence of chronic disease in adult life. This study highlights the overall low incidence of LBWs at 13.6% among the Armed Forces families. The Other Ranks had a proportionally higher incidence of LBW at 24.14%. 82.14% of the LBWs occurred in the age group of 20-29 yrs, with only 6.93% of the births being teenage pregnancies. Primiparous women accounted for 54.95% of births but 75% of the LBWs. Smoking was not a significant factor. The findings underscore the need for special attention to other rank families and primiparas. A continued effort at updating the health care facilities provided to the Armed Forces families, and a concerted health and dietary advice by the authorised medical attendants, directed at the primiparous women, will further help lower the incidence of LBWs. The National LBW target of less than 10% by 2000 AD is definitely achievable by the Armed Forces.

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KEY WORDS: Determinants of LBW; Low birth weight; Maternal risk factors.

Introduction

Birth weight is an important determinant of child health. Low birth weight (LBW) children are responsible for a very significant proportion of morbidity and mortality in childhood, whereas children born with adequate birth weights are reported to do well even under relatively adverse environmental conditions. Low birth weight is now also being incriminated for occurrence of many a chronic diseases in adult life.

It is well known that birth weight is influenced by two major factors, namely, the period of gestation and the rate of intrauterine growth. Low birth weight (LBW) defined by WHO as a birth weight of less than 2500 gms, is the result of either short gestation and/or retarded intrauterine growth [1]. This report forms part of a larger study on the health profile of Under-fives in the Armed Forces population in Pune. The objective of the article is to highlight the incidence of Low Birth Weight among Armed Forces families and to identify and study the effect of specific Maternal factors associated with birth weight.

Material and Methods

A cross-sectional survey was carried out in the Army population at Pune Cantonment during the period of 01 May 96 to 31 Dec 96. The population under study consisted of 1400 children under 5 yrs of age who were living in 2765 families. A sample of 202 children

was selected ($P=0.15$; $d=0.05$; 95% CL) based on a systematic random sampling procedure. Birth weight was checked from the mothers and verified with the Child health card/Birth certificate issued by hospital in 195 (96.5%) of the subjects. The remaining mothers were definitive about their child's birth weight. Using an extensive pretested protocol, information was collected on the variables of interests, like age of the mother at the time of pregnancy, birth order, birth interval, socioeconomic status, literacy level and smoking habits of the mother during pregnancy.

The data so obtained was subjected to appropriate statistical analysis using Chi square test to study the significance of difference between proportions.

Results

Prevalence and Socioeconomic status

Out of the 202 births studied, 13.86% were LBW. Further, it was observed that Officers had a LBW prevalence of 10.11%, JCOs 14.29% and Other ranks 24.14% (Table-1). This difference in prevalence of LBW is statistically significant $p<0.01$.

Maternal Age at Birth

Only 14 (6.93%) of the mothers were below 20 years of age. 177 (87.62%) were between 20-29 years and only 11 (5.45%) over 30 years. 23 (82.14%) of the mothers of the 28 LBW infants were between 20-29 yrs of age (Table-2).

Maternal educational status

23 (82.14%) of the 28 LBWs occurred among mothers who had education upto the Secondary level (Table-3), and the prevalence of LBW babies decreased significantly with an increase in the literacy level of the mother ($p<0.001$).

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TABLE 1
Distribution of children according to birth weight and service rank of father

Birth weight	Socioeconomic status (Ranks)			Total
	Offrs	JCOs	OtherRanks	
< 2500	9 (10.11%)	12 (14.29%)	7 (24.14%)	28 (13.86%)
2500-< 3000	42 (47.19%)	41 (48.81%)	3 (10.34%)	86 (42.58%)
> 3000	38 (42.70%)	31 (36.90%)	19 (65.52%)	88 (43.56%)
Total	89 (100.00%)	84 (100.00%)	29 (100.00%)	202 (100.00%)

$X^2 = 15.49$ $df = 4$ $p < 0.01$

TABLE 2
Distribution of children according to age of mother and birth weight of child

Age of mother	Birth weight of child in gms			Total
	< 2500	2500- < 3000	> 3000	
< 20 yrs	00 (00.00%)	08 (09.30%)	06 (06.82%)	14 (6.93%)
20-29 yrs	23 (82.15%)	74 (86.05%)	80 (90.91%)	177 (87.62%)
> 30 yrs	05 (17.86%)	04 (36.36%)	02 (02.27%)	11 (5.45%)
Total	28 (100%)	86 (100%)	88 (100%)	202 (100%)

$X^2 = 7.13$ $df = 1$ $p < 0.01$

TABLE 3
Distribution of children according to literacy level of mother and birth weight of child

Literacy status of mother	Birth weight of child in gms			Total
	< 2500	2500- < 3000	> 3000	
Upto Primary	00 (00.00%)	08 (09.30%)	18 (20.46%)	26 (12.87%)
Secondary	23 (82.14%)	71 (82.56%)	46 (52.27%)	140 (69.31%)
Graduate	05 (17.86%)	07 (08.14%)	24 (27.27%)	36 (17.82%)
Total	28 (100%)	86 (100%)	88 (100%)	202 (100%)

$X^2 = 29.25$ $df = 6$ $p < 0.001$

TABLE 4
Distribution of children according to order of birth and birth weight of child

Birth order	Birth weight of child in gms			Total
	< 2500	2500- < 3000	< 3000	
First	21 (75.00%)	36 (41.86%)	54 (61.36%)	111 (54.95%)
Second	03 (10.71%)	36 (41.86%)	27 (30.68%)	66 (32.67%)
Third and >	04 (14.29%)	14 (16.28%)	07 (07.96%)	25 (12.38%)
Total	28 (100%)	86 (100%)	88 (100%)	202 (100%)

$X^2 = 14.37$ $df = 4$ $p < 0.01$

Birth order and birth interval

111(54.95%) of the total 202 births studied occurred among primiparous women. These primiparous women accounted for 75% of the LBWs (Table-4), thereby showing a statistically significant relationship between parity and birth weight ($p < 0.01$).

The 91 multigravidas had a lower prevalence of 7 (7.69%) LBWs, 6 (92.86%) of which had a birth interval of 2 years and over (Table-5). 3 were second gravida and 4 third gravida with three children each.

Discussion

The overall incidence of Low birth weight (LBW) in this study was 13.86% (Table-1) with proportionately higher among Other Ranks at 24.14% compared with the National average of 30% (1980-88) [1]. Deshmukh et al [2] reported a LBW prevalence of 30.3% while Deswal et al [3] in a recent study have reported an overall LBW prevalence of 21.8%. The

TABLE 5

Distribution of children according to birth interval and birth weight of child

Birth interval*	Birth weight of child in gms			Total
	<2500	2500-< 3000	> 3000	
Less than 2 yrs	01 (14.29%)	18 (36.05%)	09 (25.00%)	28 (30.77%)
2 yrs and over	06 (85.71%)	32 (63.95%)	25 (75.00%)	63 (69.23%)
Total	07 (100%)	50 (100%)	34 (100%)	91 * (100%)

X² = 1.83 df = 2 p > 0.05 NB: * = Excluding 111 primiparas

lower incidence in the present study is possibly due to the better Maternal and Child Health services being provided to a well defined Armed Forces clientele living under healthy environmental conditions. Gattani & Nimale [4] reported an incidence of 27.6% from Aurangabad in subjects from a lower socioeconomic strata. The mean birth weight in our study was 2864.60 gms with a Standard deviation of 487.73 compared with an all India average of 2627 gms [1] and 2669 gms reported by Deshmukh et al [2].

The Rank structure of the Armed Forces provided a surrogate measure of the socioeconomic status of the study population. The proportion of LBW babies significantly increased over the three categories of service personnel ($p < 0.01$). The lowest prevalence (10.11%) was observed in the Officers category followed by JCOs, and Other Rank categories thereby showing a significant association with the socioeconomic status (Table-1). Ghosh et al [5], Datta Banik et al [6] and Van Sprundel et al [7] also observed a similar significant association and even suggested that birth weight could be used as an indicator of socioeconomic development. It is possible that the socioeconomic status is responsible for causal determinants of birth weight such as maternal nutrition and general morbidity [1].

Maternal age at birth is mainly mediated through parity, nutritional status and underutilisation of health care but also has an independent association with birth weight [1]. In our study, only a small number of 14 (6.93%) of the 202 mothers were under 20 years of age, which compares well with 10% reported in the WHO study in India [1]. This is due to greater awareness and better living standards of the Armed Forces families where the entitlement to married accommodation is linked to the Servicemen being 25 years of age, therefore, fewer under 20 pregnancies. Of the mothers who gave birth to LBW infants, 23 (82.14%) were in the age group 20-29 yrs (Table-2), compared with 60% reported in a Multicentre WHO study in India, Nepal and Sri Lanka [1], and 64.16% noted by Gattani and Nimale [4] from Aurangabad. The role of living

standards has also been highlighted by Anderson and Bergstrom [8]. Age however, was not observed to have a significant impact on the incidence of LBWs by Mondal [9] from Arunachal Pradesh. The fewer births in women below 20 yrs of age indicate to a lower incidence of teenage pregnancies among the Armed Forces families as a result of late marriages because of service conditions of defence personnel.

23 (82.14%) of the 28 LBWs occurred among mothers who were educated upto the secondary level and 5 (17.86%) were graduates (Table-3). This was statistically significant ($p < 0.001$). Makhija and Murthy [10] from AIIMS, Delhi observed LBW infants more among illiterates and those below primary education. In the present study there were no illiterates, therefore all the LBWs were performed among the other groups, with resultant lower prevalence. Lower prevalence of LBW among the literate would suggest that the improvement in the education standards of women would contribute to the lowering of LBWs. However, Molly, from Kerala which has 100% adult literacy reported no significant association between of LBW and maternal education [11]. Similarly, Deswal et al [3] from Meerut, observed education level of mothers as not significant. In future, once the literacy levels improve attention will have to be focused on the changing pattern of factors responsible for LBW that would demand intervention for a further lowering of LBWs.

111 (54.95%) of the total births occurred in primiparous women, because of larger number of younger couples among the other ranks, compared with 30.1% reported in the WHO study [1] and 27.22% observed by Gattani and Nimale [4]. Chakraborty et al [12] from Calcutta also reported the LBW proportion to be greatest for the first pregnancies. This is an expected finding that is peculiar to the Armed Forces situation where a large percentage of other rank leave service by 35 years of age. Accordingly, there were only 4 grandmultiparas and all had 3 children each, and were healthy. Further, being larger in number, the primiparous women in this study accounted for 21 (75%) of the 28 LBWs (Table-4). This observation of LBWs in

primiparas is in conformity with the trend in the WHO study [1]. The younger primiparous mother, is more at risk possibly because of poor nutritional status and underutilisation of health care services which could be the contributory factors [1]. Increasing awareness of the group for the need of regular antenatal care would help lower the incidence of LBW.

Only 7 (7.69%) of the 91 multigravidas had LBW infants, though 6 of the 7 had a birth interval of over 24 months (Table-5). Three were second gravida and four third gravidas. The low birth weight in these subjects with a long birth interval is possibly due to the influence of other factors, possibly nutritional in nature as they were otherwise healthy. Smaller number of LBWs among grandmultiparas precludes further analysis and suggestions. The increase in the birth interval however, is a pointer to better MCH services alongwith widespread contraceptive availability and accessibility to health care services. The study, compares favourably with the average pregnancy interval of 21 months reported for India [1]. This could also be attributed, especially for those from rural areas due to universal breast feeding. Matoo and Shah in Srinagar had reported 36.3% with birth intervals of more than 27 months [13] whereas Gattani and Nimale [4] had a higher (67.11%) number of LBWs with a birth interval of more than over 24 months.

Smoking was not reported by any of the mothers. This observation is similar to that reported in the Multicentre WHO study [1] where none of the Indian subjects gave history of smoking. Smoking though a known significant factor for LBW [14], was not of significance in this study.

In conclusion, it is observed that the other rank families have a comparatively higher incidence of low birth weight among the Armed Forces families and therefore, alongwith the primiparous mothers need special attention during the antenatal check-ups. The findings underscore the good quality of life and health care facilities made available to the Armed Forces families. With continued efforts at updating these facilities and special attention to the at risk groups, the target figure of LBW <10% by 2000 AD is definitely

within the reach of the Armed Forces.

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