CHAPTER VI

SUMMARY AND CONCLUSIONS
Studies on growth and development of children have always occupied a very prominent position in scientific research. Marked emphasis has been placed on the patterns of growth and development in man and how the growth pattern might be altered by nutrition, socio-economic status, climate, geography, biological factors and the like. In recent times scientists have been interested in understanding how growth and development of children are governed by maternal factors such as maternal age, length of gestational period, parity, maternal diet during pregnancy especially maternal intrinsic environment such as placental abnormalities and blood groups.

The studies of Hirszfeld and Zborowski (1925-26) regarding the distribution of the ABO blood groups in mothers and their children, in the context of growth, have shown that children with blood groups compatible with their mothers, e.g. O-0 and A-A had heavier birth weight.

Studies carried out on human growth in India have mainly dealt with simple height and
weight statistics with reference to the socio-economic and nutritional status of different tribal and non-tribal populations.

The aim of the present study was to test the following hypothesis: Because of possible immune stress due to maternal foetal ABO blood group incompatibility the incompatible children may have somewhat retarded growth as compared to compatible children.

The Khairwar is a primitive tribe found in Madhya Pradesh and Bihar. In Madhya Pradesh they are mainly concentrated in the Surguja and Damoh districts. According to 1971 Census, their total number in Madhya Pradesh was about 62,909. Out of these nearly 20,000 were counted in Surguja district. They are patrilineal, endogamous in nature and prefer exogamous clans for marriages.

The work embodied in this thesis is based on anthropometric and serological data on 303 Khairwar children (163 boys and 140 girls) aged
weight statistics with reference to the socio-economic and nutritional status of different tribal and non-tribal populations.

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The work embodied in this thesis is based on anthropometric and serological data on 303 Khairwar children (163 boys and 140 girls) aged
between 1 to 15 years and sampled from the villages of Harra (Manendragarh tehsil), Pandri (Wadafnagar tehsil), Anjni (Pratapur tehsil) and Chapda (Surajpur tehsil) of the Surguja district.

In addition to anthropometric measurements information on their diet and vital statistics were also collected. Blood samples were collected also from the mothers of the sampled children.

The Khairwar boys had higher mean values as compared with the girls in the 1 to 3 year group in case of height, 4 to 6 year in height illiospinale, biacromian breadth, upper arm extremity length, head circumference, wrist circumference, bicondylar humerus and femur, 7 to 9 year in weight, biilliocristal breadth, head circumference, upper arm circumference, wrist circumference, calf circumference, bicondyllar humerus and femur, 10 to 12 year age group in the calf circumference, bicondylar humerus and femur, 13 to 15 year group in the height, head circumference, upper arm circumference, wrist circumference, calf circumference, bicondylar humerus and femur.
The girls had higher mean values compared to the boys at 1 to 3 year group in case of body weight, height, height illiospinale, biacromian breadth, biilliocristal breadth, upper arm extremity length, head circumference, upper arm circumference, wrist circumference, calf circumference, bicondylar humerus and femur, 4 to 6 year group in the height, biilliocristal breadth, upper arm circumference, calf circumference, 7 to 9 year group in the height, height illiospinale, biacromian breadth, upper arm extremity length and upper arm circumference, 10 to 12 year group in the body weight, height, height illiospinale biacromian breadth, biilliocristal breadth, upper arm extremity length, head and wrist circumference, 13 to 15 year group in the body weight, height illiospinale, biacromian breadth, biilliocristal breadth and upper arm extremity length.

Mostly higher mean values of successive age groups of 4 skinfold measurements have been found in the girls as compared with the boys.

Among the boys the peak growth velocity was found in the age group 12 to 15 years for
body weight and upper arm circumference, in the age group 9 to 12 years for height illiospinale, biacromian breadth, and wrist and calf circumference. A moderately increased velocity was noted in the age group 9 to 12 years for height vertex, biiliocristal breadth and total upper arm circumference, in the age group 3 to 6 years for head circumference and in the age group 3 to 6 years for bicondylar humerus and bicondylar femur.

For the Khairwar girls the peak velocity was observed in the age group 9 to 12 years for all measurements except the skinfold.

The trend of growth in both boys and girls indicated:

(i) a period of steady pattern of growth
(ii) a period of steep rise
(iii) a period of stationary growth and finally
(iv) a period of steady growth.
The incompatible boys had higher mean values in age groups 1 to 3, 7 to 9 and 10 to 12 for body weight, wrist circumference, calf circumference, bicondylar humerus and bicondylar femur. They showed also higher mean values in all age groups for height vertex, height illiospinale (except in 13 to 15 year age group), biacromian breadth, total upper arm extremity length, head circumference and upper arm circumference (except in 13 to 15 age group) in 1 to 3 and 13 to 15 year age groups in the biillio-cristal breadth in 4 to 6 year age group in the biceps skinfold and calf skinfold in 7 to 9 year group in the calf skinfold and in 1 to 3 and 10 to 12 year age groups in subscapular skinfold when compared with the compatible boys.

The compatible boys showed higher mean values as compared to the incompatible boys in 4 to 6 and 13 to 15 year age groups in body weight and bicondylar femur in 13 to 15 year group in height vertex and upper arm circumference in 1 to 3 and 13 to 15 year groups.
in wrist and calf circumference and bicondylar femur in 1 to 3, 7 to 9 and 13 to 15 year age groups in the biceps skinfold, 1 to 3, 4 to 6 and 13 to 15 year age groups in the triceps skinfold, 1 to 3, 10 to 12 and 13 to 15 year age groups in the calf skinfold, 4 to 6, 7 to 9 and 13 to 15 year age groups in the subscapular skinfold and equal values at 10 to 12 year in the biceps skinfold whereas 7 to 9 and 10 to 12 year age groups in the triceps skinfold.

The 't' values indicate that incompatible boys had statistically significant (p < 0.05) higher mean values in 7 to 9 year age group in body weight, height illiospinale, total upper arm extremity length, bicondylar humerus and bicondylar femur. In 10 to 12 year group they had higher values in upper arm circumference and subscapular skinfolds. Statistically highly significant (p<0.01) values were found in the age group 7 to 9 year for height vertex, biacromian breadth, subscapular skinfold in 10 to 12 year group for height vertex in 1 to 3 year group for wrist circumference in 4 to 6
year group for subscapular skinfold and in 13 to 15 years group for calf skinfolds.

Among the compatible boys higher mean values showed marginally significant differences ($p < 0.05$) for the subscapular skinfold in 7 to 9 and 4 to 6 year age groups and differences at 1 per cent level for calf skinfold in 13 to 15 year age group.

In the incompatible boys the peak velocity was observed in 6 to 9 year age group for height vertex, biacromian breadth, bicondylar humerus, bicondylar femur in 3 to 6 year age group for total upper arm extremity length and head circumference in 12 to 15 year age group for upper arm circumference and in 9 to 12 year age group for wrist and calf circumferences. A moderate peak velocity was observed in 3 to 6 year age group for body weight and height iliopinale and in 6 to 9 year age group for biillio-cristal breadth.
The compatible boys showed the peak velocity for biilliocristal breadth, head circumference and upper arm circumference in the age group of 12 to 15 year and for upper arm extremity length in the 3 to 6 year age groups.

In the incompatible girls higher mean values were recorded in 7 to 9 and 13 to 15 year age groups in body weight, upper arm circumference, biacromian breadth, calf circumference in 7 to 9, 10 to 12 and 13 to 15 year age groups in height vertex, height illiospinale and upper arm circumference in 4 to 6 year age group in the biceps skinfold and calf skinfold, in 4 to 6 and 13 to 15 year age group in triceps skinfold in 10 to 12 and 13 to 15 year age group in subscapular skinfold and equal values at 7 to 9 and 13 to 15 year age groups in case of the biceps skinfold and 1 to 3 year group in the subscapular skinfold.

The compatible girls showed higher mean values in 1 to 3, 4 to 6 and 10 to 12 year age
groups in body weight, biacromian breadth, total upper arm extremity length, calf circumference in 1 to 3 and 4 to 6 year age groups in height vertex, height illiospinale and upper arm circumference in 1 to 3 and 10 to 12 year groups in triceps skinfold in 1 to 3, 7 to 9 and 10 to 12 year age groups in calf skinfold and in 1 to 3 4 to 6 and 7 to 9 year age groups in subscapular skinfold.

The 't' values showed that incompatible girls had moderately higher mean values \((P < 0.05)\) in the 13 to 15 year age group for biacromian breadth, biiliocristal breadth, calf circumference, triceps and subscapular skinfold and highly significant \((P < 0.01)\) values for head circumference.

Among the compatible girls moderately significant \((P < 0.05)\) higher mean values were observed in the age group of 10 to 12 and 13 to 15 in case of biiliocristal breadth and bicondylar femur respectively and highly
significant ($P < 0.01$) values in 4 to 6 year age group for subscapular skinfold, in 7 to 9 year age group for triceps skinfold in 10 to 12 year group for biceps and triceps skinfolds and in 13 to 15 year group for bicondylar humerus.

In the compatible girls peak velocity was recorded for height vertex, height illiospinale, biacromian breadth, biiliocristal breadth, total upper arm extremity length, head circumference, upper arm circumference, calf circumference and bicondylar femur in the 9 to 12 year age group. In 12 to 15 year age group it was found only for body weight and in 9 to 12 year age group for wrist circumference and bicondylar humerus.

The incompatible girls showed peak velocity for height illiospinale, head circumference, upper arm circumference, wrist circumference and calf circumference in the age group of 9 to 12 and for height vertex and total upper arm extremity length in the age group of 6 to 9 years. In 12 to 15 year age group the peak velocity was found in biiliocristal breadth whereas a moderate
peak velocity was observed in the 6 to 9 year age group for biacromian breadth, bicondylar femur, bicondylar humerus and in 9 to 12 years for body weight.

Maternal-foetal ABO blood group incompatibility and its effect on the heterozygous child has been a subject of almost as much debate as that concerning the Rh incompatibility. As in the latter case the ABO incompatible foetus, too, confronts a presumably hostile maternal intra-uterine environment and it has been noted that although overt ABO haemolytic disease is of an order only about two per thousand, the earlier foetal loss from ABO incompatibility is fairly common (Levene and Rosenfield, 1961). However, the question of immediate concern to us was whether or not ABO incompatibility influences the postnatal growth of children and the result of the present investigation, indeed, do suggest that if might do so. We have noted significant differences in number of body segments between the compatible and incompatible children but in substantial
disagreement with our hypothesis it is the incompatible children who, by and large, have shown increased growth in larger number of body segments. Clearly, therefore, the results need to be looked at from other angles.

Human growth is a complex phenomenon with different parts of the body growing at different rates and the patterns of growth differing from each other in the prenatal, postnatal, adolescent and post-adolescent periods of life. It should be borne in mind also that besides the various hormones growth is controlled also among others, by such factors as genetics, nutrition, season of year, psychological disturbance and socio-economic levels. Obviously not all these variables could possibly have been controlled while making this study and this might explain at least some of our anomalous results.

The phenomenon of "catch up" or "compensatory growth" may be offered as another
explanation for the overall better growth of incompatible children as against the compatible ones. The ability in animal and man to stabilize and make up for loss in growth suffered as a result of a debilitating factor is a well known phenomenon. It is not unlikely that such compensatory growth may be occurring in ABO incompatible children following traumatic prenatal experiences.