DISCUSSION
This research study entitled "Impact of mid day meal on nutritional status and academic achievement of school children in Aligarh city" was conducted among selected 600 samples. Out of 600 selected samples, 300 children were from government primary school and remaining 300 children were from private primary school in which almost children having same socio-economic status were studied and were between 6 to 14 years of age. The study was undertaken in government and public primary schools of Aligarh city (urban areas) of Uttar Pradesh. The sample data was collected during 2009-2011 from pre-identified schools. The salient findings of this study have been discussed in the light of available literature under different heads and subheads in the following paragraphs.

5.1 Profile of MDM and NMDM School Children

The total number of selected children were 600, out of which 300 (138 boys and 162 girls) were from government primary schools where mid day meal was given to the children and remaining 300 (135 boys and 165 girls) were from non-mid day meal school (private primary school) in the age group 6 to 14 years. Out of the total 46% (138 boys) the maximum boys of MDM school were 12 years old and were 22.50%. Out of total 54% (162 girls) the maximum numbers of girls of MDM school were of 10 years old and were 19.75%. In NMDM school, maximum numbers of boys were of 11 years old (21.48%) and maximum numbers of girls were of 12 years of age (31.51%).
Out of total MDM school population, maximum numbers of children i.e. 20.67% were of 10 years old and minimum (3%) were of 6 years old, whereas in NMDM school, the maximum numbers of children i.e. 80% were of 12 years old and minimum (2.34%) were of 8 years old. It was interesting to note that in NMDM school not a single sample of age group 6 and 7 years was found. This may be because all private schools have set a qualify age limit for children at the time of their admission whereas the case is reverse in MDM school where the priority is to enroll every child between the age of 6 to 14 years.

MDM Muslim school boys were found more (64.50%) in comparison to Hindu school boys (35.50%). Similarly in MDM school Muslim girls were found more (52.46%) than Hindu girls (47.54%). Similar pattern regarding religion of school children was found in NMDM school, where the Muslim children were found more (73.67%) than those of Hindu children (26.34%).

The maximum numbers of MDM school boys was found in class III (32.60%) and minimum in class V (20.30%). The maximum numbers of girls (37.03%) were found in class I and minimum were found in class V (13.60%). In NMDM School, a majority of both boys and girls were in class I, probably this is due to that these children have large families and limited resources and parents enrolled then in school so early so that they could eat food and get scholarship from the school regularly.

In both types of school i.e. MDM and NMDM, almost three-fourth i.e. 75% and 78%, respectively, children were having family members 5 to 9. Very few children were having less than four family members, in both schools. Probably, this might be due to the low economic status of
the family and lack of awareness on the part of parents who think that as many children they could have will help them to increase their earning.

More than fifty percent families of both MDM and NMDM school children were having only one earning member. As most of the children belong to low socio-economic status and having large families, only one member either mother or father has to go for work and the other has to stay at home to look after children.

Discussing the family income of school children, more than fifty percent families of children (both MDM and NMDM) were having an income of Rs.3000 to Rs.6000. The earning members of most of these families were daily wagers, rickshaw pullers, laborer, motor mechanics, agricultural labor, home maids etc. and earn hardly Rs.150 per day.

In both types of school i.e. MDM and NMDM, 45.67% and 44.67% of father were found illiterate, respectively. However, the situation in mother was even worst, equal or more than three-fourth mothers were found illiterate. Just illiterate mothers were 15% in MDM children and only 8.66% in NMDM children. Still today a large population of our country does not know about various governmental schemes like National Literacy Mission (NLM), adult education etc. where these people could earn as well as get education so that they could spent a respectable life in the society. The main hindrance in the path of their progress is ignorance and awareness.

A large number of mothers of both school children were found home maker that was 85.67% in MDM and 87.66% in NMDM children, despite of having a large families with 5-9 family members. Social taboos associated with the female still today prevail in our society that confined them in the four walls of house.
Discussion

It was found that out of the total (300 of each school children) 46.33% children of NMDM school and 49.33% children of MDM school were having low standard of living. 12.67% in NMDM children and 12.34% in MDM children were having high standard of living. The reason of their low standard of living was according to the present study found to be illiteracy, lack of proper livelihood and large number of family members.

The children with good personal hygiene was found to be more than double in NMDM school than those in MDM school. More than fifty percent children of MDM school was found to have poor personal hygiene which was found lower in NMDM school children in the present study. These children mostly belong to the poor families and were lacking in proper basic facilities like availability of water, money, proper or good shelter.

5.2 Height and Weight of MDM and NMDM School Children

In the present study it was observed that the range of mean height of MDM boys extends from 113.5 cm to 155.65 cm with total increment of 42.15 cm and in MDM girls the range of mean height extend from 116.31 cm to 152.05 cm with a total increment of 35.74 cm between age of 6 to 14 years. Regarding the case of NMDM boys the mean height ranges from 126.88 cm to 155.79 cm with a total increment of 28.91 cm and in girls the range of mean height extend from 126.50 cm to 153.75 cm with a total increment of 27.2 cm between the age of 8 to 14 years. It was observed in the present study that in both the cases i.e. MDM school children and NMDM school children, the total increment was more in girls than in boys. It was observed by Bhasin et al. (1990) that the increment in boys was 54.39 cm and in girls was 49.35 cm which was
found contradictory to our study. Khalil and Khan (2004) found that the overall increase in mean height is more in boys (40.52 cm) than girls (37.35 cm). This study lies opposite to the present study in which the increment in girls was more than in boys.

A total weight gain of 16.15 kg was registered in MDM school boys and 17.62 kg was registered in NMDM boys between 6 to 14 years and 8 to 14 years, respectively. On further analysis, it was observed that the total weight gain was lower in both MDM and NMDM children of present study in comparison to other anthropometric studies (Agarwal et al. 1992; Bhasin et al. 1990). The total weight gain of 19.65 kg was recorded in MDM girls between 6 to 14 years and the total weight gain of 17.04 kg in NMDM girls in age 8 to 14 years was recorded in the present study but lower in comparison to other anthropometric studies and standards (Agarwal et al.1992; Bhasin et al.1990).

When the mean height of MDM and NMDM boys was compared with CDC standard, it was observed lower at all ages, the difference ranges from 0.29 cm to 9.74 cm in MDM boys and NMDM boys the differences ranges from 2.28 cm to 8.31 cm was observed except at age 8 where the boys showed 2.23 cm more height than CDC standard. In comparison to the study of Devi and Mayuri (1999) at Andhra Pradesh, the height of boys of MDM and NMDM school were slightly lower at age 11 years but higher in all other age groups till 12 years. When the results were compared with Khadi et al. (2001) study of Northern Karnataka children, with the height of children in the present study, in case of MDM, children were found equal at 10 years, less at 7 years and 8 years and in rest of the age groups the heights were higher. In case of NMDM, the height of children in the present study was found equal at 9 years and in rest of age groups it was higher. On comparison with Durrani (2003) study, the
height of boys in present study were equal at 9 years and 13 years, higher at 8 years and lower at 7 years, 10 years, 11 years, 12 years and 14 years in case of MDM boys where in NMDM boys the height were higher at 8 years and less at 9 years to 14 years (Refer table 4.3.5).

On comparison with CDC standard the height of MDM and NMDM girls were higher at age 6 and less in rest of the age groups, the difference ranges from 4.47 cm to 11.01 cm in MDM girls. On comparison with Agarwal et al. (1992), the height of MDM girls was equal at 8 years, higher at 6 years and 12 years and less in rest of the age groups. In case of NMDM girls it was equal at 13 years and 14 years, higher at 8 years, 10 years and 12 years and less at 9 years and 11 years. On comparison with Khadi et al. (2001), the height of children in the present study, in case of MDM girls were higher at all ages except 9 years where as in case of NMDM girls were higher at all ages. On comparison with Durrani (2003) the height was higher at all ages in both MDM and NMDM girls (Refer table 4.3.7).

The results of present study on weight of MDM and NMDM boys were compared with CDC standard. The mean weight of the MDM boys in the study indicates that they were consistently lower than CDC standard at all ages differing from 3.8 kg to 15.05 kg. Whereas, in NMDM boys, the weight was equal at age of 8 years and less in rest age groups. On comparison with Khadi et al.(2001) the weight of MDM boys was found higher at 6 years, 11 years, 12 years, 13 years and 14 years and less at 7 years, 8 years, 9 years and 10 years, whereas, in NMDM boys weight was found equal at 9 years and higher in rest of all age groups. On comparison with Durrani (2003) the weight of MDM boys was found equal at 6 years, 11 years and 12 years and less in rest of all age groups.
whereas in NMDM boys the weight in present study was higher in all age
groups except 9 years (Refer table 4.3.9).

The weight of MDM and NMDM girls was found to be lower at all
ages in MDM girls the difference ranges from 5.05 kg to 14.4 kg
similarly; in NMDM girls the weight was found to be lower at all ages
except at 8 years. On comparison with Khadi et al. (2001) the weight of
MDM girls was found equal at 6 years, less at 7 years, 9 years and 10
years, and higher in 8 years, 11 years, 12 years, 13 years and 14 years and
the weight of NMDM girls was found higher in all groups. On comparing
the data of present study with Durrani (2003) study, the trend reflected
was lower at all ages in NMDM girls where in MDM girls the weight was
found equal at 8 years, higher at 12 years and lower in rest of all age
groups (Refer table 4.3.11).

5.3 Nutritional Status of MDM and NMDM School Children

Stunting (Height-for-age)

In the present study, the overall prevalence of stunting in MDM
school children was observed 75% as compared to 56.34% in NMDM
school children, 18.66% higher in MDM children. It was found that in
MDM school more boys were found stunted than girls where as in
NMDM school the trend was found reverse i.e. more girls were stunted
than boys. According to Kanani and Gopaldas (1998) more mid day meal
program beneficiaries were affected from stunting in age group between
10 to 15 years whereas in present study the most stunted MDM children
were in age group 8 to 12 years and in case of NMDM school more
stunted children were of age group 6 to 8 years and 10 to 12 years. With
regard to Gopaldas (2003) the older boys and girls (11 to 15 years) were
found to be more under nourished than younger children in school
Discussion

providing mid day meal. In present study, in case of girls (of both schools) follow the above study but become contrary in case of boys (of both schools) as more stunted boys were of 9 to 11 years.

The results of present study revealed that the percentage of stunted children was more in MDM children as compared to NMDM children. Contrary to above finding Laxmaiah et al. (1999) found that the percentage of stunted children was lower in MDM schools (50.8%) as compared to NMDM schools (54.1%). They concluded that the children who are receiving mid day meal have a better nutritional status than those of non-receivers. The results of above study were found opposite to the results of present study.

With regard to the impact of mid day meal on nutritional status of school children there was a similarity of results of present study with Semeoal et al. (2006) study who found that the prevalence of stunting in MDM school was 26.3% higher than NMDM school. Thus the above study as well as present study reveals the poor status of school children in spite of MDMP. The similar finding was of Gopaldas (2003) who found primary school age children (6 to 14 years) stunted or short, skinny or underweight, in spite of being a regular recipient of mid day meals. Thus it was concluded that the school meal program is not fulfilling its purpose of improving nutritional status among school age children.

Thinness (BMI-for-age)

In comparing the growth status of school children (MDM and NMDM) in this study with other growth studies in India the findings were not in total agreement. It was observed that with regard to some studies there was a similarity and for others a high prevalence rate was observed in the study. The present study revealed that the boys of MDM school
were found to be higher in the prevalence of thinness (89.14%) than those of NMDM school boys (79.26%). In MDM the younger boys of age 6 to 8 years were found to be affected most and followed a decreasing trend as age increases whereas in NMDM boys of 12 to 14 years were affected more with thinness and showed an increasing trend as the age increases.

In MDM and NMDM girls, the prevalence of thinness was found to be higher in older MDM girls of age between 12 to 14 years, however the percent of thin girls in MDM school at every age was found higher than those of the percentage of NMDM girls. The findings of present study confirm the observation made by Kanani and Gopaldas (1998) who found most affected MDM children in age group 10 to 15 years. Contrary to the results of present study, Gopaldas (2003) found that the prevalence of thinness (under nutrition) was higher in older boys and girls (10 to 15 years) whereas in MDM boys the prevalence was more in younger boys of 6 to 8 years and 10 to 12 years. According to Laxmaiah et al. (1999) the wasted or thin children were more in NMDM children (4.8%) than their counterpart MDM children (3.6%), contrary to the present study where the prevalence was higher in MDM children rather NMDM children. The results of Gopaldas (2003) study was similar to the results of present study who found that being a regular recipient of mid day meal, the children were found skinning or underweight. Thus it was concluded that the school meal program is not fulfilling its purpose of improving nutritional status among school age children.

In the present study it was observed that the family income have a significant effect on the nutritional status of MDM school children. The results of the present study correlate with the findings of the earlier studies of Gopalan (1992) who found that the height and weight of poor children were much lower than the affluent children.
In the present study the working status of mother had a significant relation with the nutritional status of MDM children. The higher percentages of children of homemaker mothers were found to be suffering from under nutrition (thin + severely thin) against the children of working mothers. The present study results confirm the findings of Durrani (2003) who found the similar results. Zaki (1999) found a positive relationship between maternal employment and the nutritional status of their children. But these findings were contrary to the National Family Health Survey (NFHS)-2 (2000) report that observed an increased percentage of underweight children in working mothers as compared to non working mothers. It may be noted that due to maternal employment and consequent extra increased income, improves living conditions and facilities, leading to a positive impact of maternal employment on the nutritional status of children.

As far as the effect of family types on nutritional status of MDM school children was concerned a significant effect was observed. Contrary to the above finding Doan (1989) and Vazir et al. (1998) stated that children of extended family were shown to have lower weight-for-age than children in nuclear families. This could be attributed to a more understanding and supportive role being played by the joint families in the modern content. At the same time the parents in nuclear families also have taken up more defined role.

In the present study it was observed that the standard of living had a significant effect on the nutritional status of MDM school children (poor children). Relevant studies were not found in support of the present results. Such condition prevail due to the low per capita income where most of the families do not have enough money to purchase the basic
items of living, then how they can afford a high or medium standard of living.

The personal hygiene of MDM school children was found to have a significant effect on the nutritional status of these children. Awate et al. (1997) assessed school children and found 86% children having poor personal hygiene. In present study it was observed that the children having poor personal hygiene were more malnourished or undernourished as compared to those who have fair and good personal hygiene. Similar findings were observed by Awate et al. (1997).

The study revealed that the percentage of children suffering from under nutrition was found to be lower among those who receives good quality of mid day meal as compared to those who receives average and poor quality of mid day meal and showed a highly significant effect on the nutritional status of MDM school children. According Pottertion and Dawjee (2004) the quality of food received in school was not always good. According to Anna Adhikar Abhiyan Maharashtra (2006) report in the study of village schools the quality of food being provided was average however, in one-fourth school the quality of food was poor.

In the present study, out of total 5 selected schools, 3 schools were providing good quality of rice, 2 schools were providing good quality of dalia and 1 school was providing good quality of dal (lentil and moong whole), rest of the school in each food items either providing fair or poor quality of food items. It was astonishing to note that only 1 school out of five schools used soyabean in the preparation of mid day meal which was of average quality.

Yet another interesting point was noticed that tahiri was the most repeated food item of mid day meal, which was given more than twice a
week. In the present study, it was observed that only 280.33 Kcal and 9.12 gm of protein were provided to each child per day through the MDM program and the content of energy and protein showed a insignificant effect on the nutritional status of MDM school children. The results of above study were found reverse to Laxmaiah (1999) study, where the average energy and protein supplied to a child by the supplement was 303 Kcal and 7.2 gm, respectively.

It was strange to note the eating of mid day meal had a significant impact on the prevalence of under nutrition in MDM school children. Similar results were also obtained by Kanani and Gopaldas (1998) that ‘stunted’ and ‘wasted’ or malnutrition affected more in MDMP beneficiaries. Apart of the world largest school meal program, the program is enabling to fulfill its objective of improving the nutritional status of school children by providing noon-meal for the purpose of suppressing hunger.

Yet another interesting point was noticed that the children who never like the mid day meal have better nutritional status than those who always or sometimes like mid day meal. The likeness toward mid day meal leave a significant effect on the nutritional status of MDM school children. According to De Anuradha et al. (2005) the quality of rajma and vegetable pulao in mid day meal has not been up to the mark and not liked by recipients. Further, school children found mid day meal very unattractive. In Gangadharan (2006) study it was identified that the menu for mid day meal should be improved and made attractive and some children highlighted the need for a change in the monotonous menu of khichiri everyday. Meal should be made palatable so that it would be liked by school children.
Discussion

A significant relationship was found between feeling of full stomach after eating mid day meal and prevalence of thinness in MDM school children. The above results suggests that the nutritional status of children is not totally depend upon mid day meal but their family income, nutrient intake play a significant role. Gangadharan (2006) noticed in his study that the mid day meal was not given in adequate quantity to the children because of which most of the children do not feel full stomach.

The prevalence of under nutrition was found to lowest among those children who obtained marks above 70% that is grade A. The maximum percentage of under nourished children (89.76%) were those obtained marks between 45 to 54% i.e. grades C. According to Centre on Hunger, Poverty and Nutrition Policy (1998) research studies indicate that under nutrition during any period of childhood, even for relatively short term episodes, can have negative effects on the cognitive development thus leads to poor school performance among children.

It was observed in the present study that the nutritional status of MDM school children was greatly influenced by the prevalence of nutritional deficiencies in MDM school children. Similar finding of highest percentage of anemia then vitamin A deficiency and least of vitamin B-complex deficiency was noticed by Awate et al. (1997). In primary schools Gopaldas (2003) stated that the average Indian school children are under nourished and underweight suffers from iron deficiency- anemia and is vitamin A, riboflavin, and vitamin C deficient. The prevalence of nutritional deficiencies was higher in low socio-economic children because they were having large family with poor awareness and total ignorance.
5.4 Academic Achievement of MDM and NMDM School Children

Discussing the academic achievement of 2011, in the present study, majority of the MDM children (including both sexes) obtained grade C (42.33%) and grade B (25%) where as in NMDM school, a majority of the children (including both sexes) obtained grade A (43%) and grade B (35.33%). In general, the academic achievement of MDM children was found to be lower as compared to NMDM children. However, the proportion of students who secured grade A was 31% lower in MDM schools (12%) as compared to NMDM school (43%). Contrary to the above findings Laxmaiah et al. (1999) observed that in both MDM and NMDM areas majority of children obtained grades B and grade C and also the student who secured grade A was marginally higher in MDM children (13%) than NMDM children (10.3%). Seetharaman (2001) and Jacoby et al. (1996) also found similar findings that MDMP did not make any appreciable and significant impact on the educational outcomes of children. Confirming the present study’s finding, Goyal (2007) showed that overall learning were low absolutely and relatively in government schools. The average percentage in government school ranged from 40 to 50%, a quarter to a fifth below the average scores in private schools.

As far as the effect of family income on academic achievement of MDM school children was concerned a significant effect was observed on one over the other. In present study as the family income increased, the academic achievement of school children also increased. According to Pungello et al. (1994) the children those from low income families tended to have lower academic achievement test scores.

The working status of mother had a significant impact on the academic achievement of MDM school children. The academic
achievement of children with homemaker mother was found higher, might be due to the availability of mother at home all the time. The mother direct and guide them in their school work.

It was observed in the present study, a majority of MDM children (including both sexes) belonging to joint family (82.8%) obtained grade A and grade B where as those of nuclear family a majority of children (74.15%) obtained grade C and grade D. Therefore our study showed that the academic achievement of children was influenced by the types of family. According to Pollack (2005) the educational outcomes of children in stable blended families are substantially worse than those of children reared in traditional nuclear families.

Regarding the quality of mid day meal it was observed that it was insignificant with academic achievement of children as the children eating good, average and poor quality of mid day meal obtained similar grades i.e. B and C. According to Rosso (1999) and the report of Centre for Equity Studies Survey, New Delhi (2003) the school feeding can alleviate hunger and satiating children hunger in school has improved their concentration.

The quantity (energy and protein content) of mid day meal had a significant impact on the academic achievement of MDM school children.

It was observed in the present study that the eating of mid day meal was not significant with children’s academic achievement. The children who were eating mid day meal either always, sometimes and never were found to have similar academic achievement that is all obtained grades B and C. Confirming the results of present study Jacoby et al. (1996), Powell and Mathews (1998) and Seetharaman (2001) also found that
MDM or school feeding program did not make any appreciable and significant impact on the educational outcomes of children. Contrary to the above findings Meyers et al. (1999), Dairy Council Report (2002), and Laxmaiah et al. (1999) found the positive association between mid day meal and educational attainment of school children.

As far as the effect of likeness of children toward mid day meal on their academic achievement it was observed that there was not a significant impact of likeness toward mid day meal as the children who were always and sometimes like the food were found to achieve similar grades i.e. B and C as those of who never like mid day meal. The reason for poor likeness toward mid day meal was found to be the monotonous cooking of yellow rice and khichiri which made of poor quality of rice and were tasteless.

Another fact revealed in the present study was feeling of full stomach after eating mid day meal had a significant impact on child’s academic achievement.

A majority of normal children were obtained grades A, B and C, thin children obtained grade B, C and D and severely thin children were found to obtained grade C and D. It was observed that the academic achievement of MDM school children was influenced by their nutritional status. According to Centre on Hunger, Poverty and Nutrition Policy (1998) research the under nutrition during any period of childhood even for relatively short-term episodes can have negative effects on the cognitive development thus leads to poor school performance, similarly, Morley and Lucas (1997) shown that the children with under nutrition or stunting perform less well on cognitive tests and academic measures than well nourished children.
Discussion

According to St. John’s Research Institute (2007) nutritional deficiencies are a major problem in school children in India and have a variety of adverse effects on their cognitive development. In present study a significant impact of nutritional deficiencies was observed on academic achievement of MDM school children.

5.5 Prevalence of Nutritional Deficiency in MDM and NMDM School Children

The present study showed that prevalence of anemia among MDM school children was 47.67% where the prevalence in boys was 47.83% and in girls it was 47.54%. The occurrence of anemia in present study was found to be lower than that of Kanani and Gopaldas (1998) study where the prevalence of anemia among MDMP beneficiaries was 73% in boys and 67% in girls higher than present study. In comparison with Osci et al. (2010) the prevalence of anemia in MDM school was found similar to the present study (36.7%). In comparison with the other Indian studies the prevalence of anemia in rural primary school (MDM) and public primary school (NMDM) were lower than the prevalence reported by Verma et al. (1998), Ingale (1985). In Mohaptra et al. (1998) study the prevalence was found to be lower in case of NMDM children but higher in case of MDM children. The study also observed the prevalence of anemia varies according to socio-economic status. The present study’s findings indicate a growing need for intervention to arrest the high prevalence of anemia. The prevalence of anemia in NMDM children was found as a total 34.34% which was lower than the prevalence among MDM children (47.67%). More NMDM boys (39.25%) were found anemic than NMDM girls (30.31%). This may be due to that the girls are becoming more aware through the extension programs how they could maintain good blood level by consuming locally available rich sources of
Discussion

Iron like jaggery, spinach (palak) etc. In comparison with Awate et al. (1997) study the prevalence of anemia in rural primary school children (5 to 15 years) were found 32.47% which was lower than the present study (47.67%).

More than fifty percent children of both MDM (57.34%) and NMDM (50%) schools were having one or other clinical signs of vitamin C deficiency. The prevalence among MDM boys and girls was higher than those of NMDM boys and girls. Relevant studies are lacked on the prevalence of vitamin C deficiency among school children.

The prevalence of vitamin A deficiency was found 38.34% in NMDM children and 44.34% in MDM children. The prevalence among boys was higher than girls in both the schools (MDM boys 49.28%, MDM girls 40.13% and NMDM boys 40%, NMDM girls 36.97%). In comparison to the Kanani and Gopaldas (1998) study on the occurrence of vitamin A deficiency in MDMP beneficiaries, the findings of the present study were very much higher than the observations made by them and also higher than the observations made by Agarwal and Singh (1999), Mohaptra et al. (1998), Mukta and Singh (1998) and Ingale (1985). Gopaldas (2003) showed that the VAD (vitamin A deficiency) is one of the prevailing nutritional health problems among mid day meal program beneficiaries (1993-1996). Laxmaiah et al. (1999) study revealed that only 9.5% children in MDM school and 9.1% children in NMDM school were affected from VAD. In comparison to Awate et al. (1997) the findings of the present study was found to be much higher.

According to Awate et al. (1997) the prevalence of vitamin B complex deficiency in rural primary school children (5 to 15 years) was found to be 2.57% where it was much higher in MDM school children of
the present study i.e. 42.66%. In NMDM children the prevalence was found to be higher than Awate et al. (1997), Mohaptra et al. (1998) who recorded 15.2% vitamin B deficiency in children age group 6 to 12 years and Sujatha (1997) revealed the prevalence of 9.22% in rural school children, but lower than the MDM children of the present study. The prevalence of vitamin B complex deficiency in MDM girls was 38.27% and in boys 47.83%. The prevalence in NMDM girls was found 36.97% and 34.08% in boys. In both sexes the prevalence was more in MDM girls and boys than NMDM girls and boys. Contrary to above study, the overall prevalence 4.76% in boys and 4.18% in girls was found by Sujatha (1997).

In the present study it was found that the overall prevalence of dental caries was 38.34% in MDM children (47.11% in boys and 30.84% in girls) and 34.67% in NMDM children (36.30% in boys and 33.34% in girls). The results of present study were found contrary to Sujatha (1997) who observed a reverse trend in dental caries being more in girls than boys. In comparison to other Indian studies the present study findings were higher with regard to the observation made by Sujatha (1997) and Agarwal and Singh (1999) but were lower in comparison to Itoo (1994).

**Limitation of the Study**

- The accuracy of the estimation of nutrient contents (energy and protein) of food consumed by MDM school children was based on Nutritive Value of Indian Foods by ICMR (1990) could not be individually determined in a laboratory.
- No intensive follow up studies could be undertaken.
- Time and resources permitting samples from others cities could have been studied to obtain more comprehensive results.
Discussion

- A longitudinal study of a smaller sample of school children would have been more meaningful instead of this cross sectional study.

Future Research Areas

- The present study should form the basis for a larger, location specific survey in the Aligarh district and other regions of Uttar Pradesh and India.

- This cross sectional study also open up a basis for further investigation in cross sectional as well as longitudinal studies on outcomes of mid day meal on school children as this area needs regular monitoring.

- Studies need to be undertaken in MDM school children on nutritional assessment and learning outcomes in other parts of India. This would reaffirm the findings of the existing study and identify other factors that relates to the mid day meal in school.

- Studies on the organization of mid day meal and its impact on school children could add to the understanding of interaction of infrastructure of mid day meal and school environment and hence deserves the attention of the future research.

- Studies on role of teachers and community in proper organization or implementation of mid day meal scheme in school are other important area suggested for further research.

- Role of nutrition education and intervention programs on knowledge, awareness and practices about nutritional status are other variables of school children that needs further scientific probing.
• Investigation on infrastructure, implementation, regulation and conduction of Mid Day Meal Scheme can also be an area of research importance.

• Research on the acceptance of supplementary nutrition programs like Mid Day Meal Scheme, Integrated Child Development Scheme etc. among community could be an attention of future researches.

• Measure to improve the implementation of Mid Day Meal Scheme from the grass root level can also be an area of research.

• Identifying problems regarding Mid Day Meal Scheme and its treatment could also an area of future research.