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EDITORIAL

ADOLESCENT HEALTH – UNIQUE CARE FOR UNIQUE GROUP

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The World Health Organization defines adolescents as young persons aged 10-19 years. There are about 1.2 billion adolescents, constitute about a fifth of the total world's population, and in recent years their numbers are in progression. Four out of five adolescents live in developing countries. The *Lancet* has published a series of reports on the largest generation of young people in history, 1.8 billion 10-24 year olds. Four reports analyze the importance of adolescent health from a life-course perspective; examine how social determinants influence adolescent health.^[1]

Adolescence considered the intermediary phase from childhood to adulthood. This phase can bring up issues of self-identity and autonomy. Adolescents can neither taken as children, nor as adults, and this period of change is full of paradox. Adolescence can be a time of both hesitation and invention.

Most adolescents are full of confidence and represent a positive energy in society, an asset now and for the future for the country as they mature and develop into adults. When supported, they can be tough enough in absorbing setbacks and overcoming problems.

Adolescents find in all shapes and sizes– being of different regions, ages, sexes, cultures and life experiences. So the concept of 'one size fits all' cannot be applicable here for providing services. The health needs of a 10-year-old boy in initial phase of puberty, and an 18-year-old girl who has just married or delivered a baby are very different. Patterns of health problems differ between and within regions. The rise of HIV infection through injecting drug use is a major concern in Eastern Europe, but not to the same extent in the South East Asia region. Within countries, outdoor violence or road traffic accidents may be a significant risk to young people in cities, while various nutritional problems and gastroenteritis may be a greater risk in rural areas.

Better addressing the needs of adolescents is a big challenge that goes well beyond the role of health sector alone. The social policies, legal framework, the safety of communities and opportunities for education, work and recreational activities are just some of the factors of civil society that are key to adolescent progress and development. However, in an integrated way, health services

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can play a major role in supporting adolescents to stay healthy and to complete their journey to adulthood without complications as well as treating those who are ill, injured or concerned and reaching out to those who are in risk.

A WHO consultation in Africa in October 2000 approved that “adolescents have a right to access health services that can protect them from HIV/AIDS and from other threats to their health and well-being, and that these services should be made adolescent friendly”. The consultation also give acceptance that adolescents’ needs cannot be met only by health services providers, but outlined an essential list of various clinical services as general health services for communicable as well as non communicable diseases, endemic diseases, injuries, accidents and dental care; reproductive health care including contraceptives, counseling and testing for HIV, which should be unlinked, anonymous and confidential; mental health services, including services to address the different types of addictions such as tobacco, alcohol and drugs; information and counseling on growth and development during adolescence, including hygiene, nutrition, sexuality and substance use. However, an appropriate range of essential services must be decided by each country, based on local needs assessments.^[2]

The Global Consultation on Adolescent Friendly Health Services held by WHO in Geneva in March 2001, recommended that a core package could not be a ‘fixed menu’. Instead, the Global Consultation suggested that each country must develop its own package, taking into consideration its way through epidemiological, economic and social constraints, including cultural sensitivities. It declared: “What is needed is a process by which government ministries can make decisions about what is most appropriate for their situation, taking into account cost, epidemiological factors and adolescent development priorities.”^[3] Hence it is country’s own responsibility to develop its own recipe to prepare dish of interest of their adolescents.

Surveys in many countries suggest that when young people are looking for urgent treatment for what they consider to be sensitive conditions, public sector health services are often their last resort. Health service providers are often dismayed by these findings, as they want to be a resource for young people but they do not know how.^[4] Adolescents face many barriers in obtaining the health services and commodities specially designed for them according to their needs. Some of important speed breakers in promotion and maintenance of good adolescent health are *Lack of knowledge on the part of the Adolescent, Poor quality of*

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available clinical services, Unwelcoming service providers, High cost, Legal or cultural restrictions, Physical or logistical restrictions and Gender barriers.

A growing number of countries are on track to defeat these barriers and to make it easier for adolescents to obtain the health services they need. Most of these efforts are small in scale and of limited time period. However, there are a steadily growing number of initiatives which have moved beyond the 'pilot project' or 'demonstration project' stage to scale up their operations to reach out to adolescents across an entire district, province or country.^[2]

Instead of setting up new service delivery points exclusively intended for adolescents, WHO's favors making of existing health facilities more 'friendly' to adolescents. Special service-delivery points and dedicated outreach services are required only for marginalized and stigmatized groups of adolescents. For example young commercial sex workers or injecting drug users may be hesitant to use a service-delivery point that is open to all others.

Government of India supports health services to be provided in a welcoming way, so that adolescents would be ready to obtain the special health services they need. WHO's generic 'quality of care' framework guides the

work on health service provision to adolescents. It provides a useful working definition of adolescent friendly health services. To be considered adolescent-friendly, health services have to be fit in principle frame of primary health care. The gold standard for adolescent friendly health services is that they should be *Effective, Safe Accessible, Acceptable, Equitable, Appropriate, Effective and Affordable*.^[6]

Developing an Adolescent Health Strategic Plan Helps to Answer These Questions^[5]

- ✓ What are the most critical adolescent health issues that require our attention?
- ✓ What do we ultimately want to achieve?
- ✓ What works to improve the health and well-being of youth?
- ✓ What are the best ways to address adolescent health?
- ✓ Who should be involved?
- ✓ How should we get things done?
- ✓ How do we garner support for these actions?
- ✓ What are the best ways to invest resources?
- ✓ How do we expand and/or redeploy our resources?

They meet the individual needs of young people and satisfactory enough they also recommend these services to friends after availing these. Even it seems to be difficult to achieve this ideal immediately but improvements certainly bring results.

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Adolescent friendly health services can not only be delivered in hospitals or at health centers but also in schools and in community settings. They may be planned from top level administration or started by groups of dedicated health care professionals who observe that the needs of adolescents are not being properly met, and who believe that services can be made more effective.

The Safdarjang Hospital in New Delhi, India, developed an Adolescent Healthcare Network (SHAHN) involving educational institutions and NGOs. SHAHN provides complete package of information, education and health services to adolescents. This package designed to address sexual, reproductive and nutritional health needs, emotional and mental health problems, and problems associated with substance abuse and violence^[7]. Haryana was one of the first states in the country to have launched a distinct Adolescent Reproductive and Sexual Health (ARSH) programme providing 'adolescent friendly health services' at government health facilities^[8].

Health and development needs of adolescents are certainly beyond what health services can do alone. As social framework is determined and regulate by the society in which young people grow up, the main teachers and guides for young people are their own parents and families. Young people are also influenced

by their teachers, religious leaders, friends, and increasingly in an era of globalization, by mass media. However, health services have a unique role as health care providers have special skills and knowledge and can intervene at certain critical points as young people develop and when they are going through a process of transformation and looking for some explanation. Major challenges lie in creating the political and community support to make changes, and in managing and funding the process.^[9]

It will also have an impact on future generations. Whatever this cohort of adolescents learns and whatever changes they make in their lives, they will pass on to their own children in time, as they become parents. The effects of a positive interaction, developing positive and favorable atmosphere that accomplish needs of current group of adolescents will in this way have benefits for generations to come. Finally, improvements in adolescent health services will act as a catalyst in the improvement process of health services for everyone, as staff attitudes change and people's expectations rise. Adolescents are on the verge of adulthood, and will continue to demand services that match their needs. Hence a good and effective Adolescent friendly health services establishment can pioneer change for the whole population and whole society.

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Assessment of the effect of Antenatal checkups and IFA supplementation on pregnancy outcome

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Abstract

Background: The antenatal care is systematic supervision (examination and advice) of a woman during pregnancy.

Objectives: To assess the effect of ante-natal check-ups and iron and folic Acid supplementation on pregnancy outcome.

Material and methods: A cross sectional study was conducted among the pregnant women admitted for delivery between the January 2008 to June 2008 in Maharani Laxmi Bai Medical College & Hospital, District Jhansi. Data collected in a pre-structured questionnaire were analyzed by using Chi square test.

Results: Frequency of low birth weight babies was 42(27.27 %), 26(24.07 %), and 7(4.38 %) in mothers who underwent nil, 1-3 and ≥ 3 ante natal checkups respectively. Relationship between iron and folic acid intake and pregnancy outcome in the form of LBW and normal birth weight babies was highly significant statistically ($p < 0.001$).

Conclusions: Ante-natal check-ups and IFA supplementation were found to be major determinants of birth weight and pregnancy outcome in the form of still birth and low birth weight.

Key Words: Ante natal care, iron and folic acid, maternal factors, pregnancy outcome, low birth weight, still births

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Introduction: Child health is closely related to maternal health. A healthy mother brings forth a healthy baby. Various social and environmental factors may influence human reproduction. The Antenatal Care is systematic supervision (examination and advice) of a woman during pregnancy. The supervision should be of a regular and periodic nature in accordance with the principles laid down or more frequently according to the need of individual. The care should start from the beginning of pregnancy and end at delivery.

Adequacy of prenatal care use and the association of use to a series of maternal risk factors and pregnancy outcomes, such as low birth weight, preterm delivery and macrosomia in both Mexican Americans and Non Hispanic Whites in Arizona were studied by Bakazar et al (1992).¹ Antenatal care plays a significant role in the birth weight of the newborn as evident by LBW proportion of 46.4% in the no care group, 40.9% in inadequate care and 30.9% in adequate antenatal care group (Gawande et al, 1994).²

Iron deficiency is the most commonly recognized nutritional deficiency in both the developed and the developing world. It is estimated that < 50 per cent of women do not have adequate iron stores for pregnancy. Requirements for absorbed iron increase during pregnancy from 0.8 mg/day in the first trimester to 7.5 mg/day in the third trimester. Average requirement during the entire gestation is approximately 4.4 mg/day. An adequate iron balance during pregnancy implies body iron reserves of >500 mg at conception. The physiologic iron requirements in the second half of gestation cannot be fulfilled solely through dietary iron.³ Iron deficiency anaemia has been shown to be associated with low birth weight and preterm delivery.^{4,5}

Low birth weight and anemia remain intractable problems in many developing countries despite considerable efforts to address them. Intervening with prenatal iron-folate (IFA) supplements may be the best approach given the substantial demands for iron by maternal and fetal tissues.

Material and Methods: This hospital based cross sectional study was carried out in the department of Social and Preventive Medicine, Obstetrics & Gynecology and Microbiology in M.L.B. Medical College Jhansi between Jan. 2008 to June 2008. Criteria for choosing the hospital of M.L.B. Medical College Jhansi as a study area was that it covers most of the patients from different parts of the Jhansi district. Women admitted for delivery in the maternity ward of the department of Obstetrics & Gynecology and their newborn babies were taken as a study unit. The study was approved by the institutional ethics committee.

Before collection of data an informed consent was obtained from all the mothers who were admitted for delivery in the department of Obstetrics & Gynecology. The low birth weight (LBW) amongst the live births of the pregnant women was considered as basis for

computation of the sample size. For this purpose, observations were initially made on first 100 study subjects as a pilot study (n=100). Amongst these pregnant women, outcome of their pregnancy for 92 women (92.0%) was a live birth while rest 8 (8.0%) resulted in stillbirths. When further observations were made on these 92 babies, it was found that 20 (21.74%) had LBW while 72 (78.26%) had normal birth weight, following the standard criteria. A sample size of 450 was calculated at 95% level of significance, 20% allowable error.

The sample size was computed using method, often applied for descriptive studies, given below (Indrayan, 2006):- Sample size (n) = $Z^2 \cdot 1 - \alpha / 2 \cdot X p (1-p) / d^2$, where d is the specified absolute precision on either side of the proportion. Here, p = 21.74, 1-p = q = 78.26 and taking d = 20% and sample was calculated as 346. Giving further allowance of non-coverage as well as non-response, on safer side, a sample of size (n) 450 was finally taken and we studied all the women who were admitted for delivery.

Information gathered and observations made were recorded on a predesigned & pretested questionnaire and outcomes were seen in the form of still births and live births & LBW and normal weight babies. The data were analyzed and interpreted by using percentages & Chi-square test and p < 0.05 was used as the definition of statistical significance.

IFA intake was classified as regular, if the mother had taken a course of 90-100 tablets during whole pregnancy, it was called irregular if she had taken less than 90 tablets and it was grouped into no tablet group if the mother reported that she not taken even a single tablet.

Inclusion Criteria: Women who had delivered in the maternity ward of the hospital and their newborn babies.

Exclusion Criteria: Multiple pregnancy and women who had not given the consent.

Result: Among all, 172 (38.22%) mothers did not have any ante- natal check up while another 160 (35.56%) mothers had 3 or more checkups. 118(26.22%) mothers had 1-3 ante- natal check up. Best pregnancy outcome was seen in mothers who had 3 or more checkups and in these mothers 146(95.42 %) pregnancies terminated in live deliveries with normal birth weight while in case of those mothers who did not undergo any ante natal check up, only 112 (72.72 %) mothers delivered normal birth weight babies.

Relationship between ante natal checkups and pregnancy outcome in the form of still births and live births was statistically significant ($p < 0.05$). Still births were highest (10.47%) in mothers who did not have any antenatal check up and relationship between ante natal checkups and pregnancy outcome in the form of LBW and normal birth weight babies was also highly significant statistically ($p < 0.001$). Frequency of LBW babies was highest in mothers who did not undergo any ante natal check up. (Table-1)

Among the mothers who took full course of iron and folic acid tablets, 1(2.22 %) pregnancy was terminated in still birth, 4(9.09 %) in LBW babies and 40(90.09 %) in live born normal weight babies. In contrast, in mothers who did not take any IFA tablet, 20(8.51%) pregnancies terminated in still birth and 53(24.65 %) in LBW babies and 162(73.35%) in live normal weight babies.

Relationship between iron and folic acid intake and pregnancy outcome in the form of still births and live births was statistically not significant ($p < 0.5$). Relationship between iron and folic acid intake and pregnancy outcome in the form of LBW and normal birth weight babies was highly significant statistically ($p < 0.001$). Frequency of LBW babies was high in mothers who had not taken any IFA tablets. (Table-2)

Table 1: Pregnancy outcome according to ante natal checkups

Ante-natal Checkups	Still Birth		Live birth						Grand Total	
			Low Birth Weight		Normal Birth Weight		Total			
	No.	%	No.	%	No.	%	No.	%	No.	%
Nil	18	10.47	42	27.27	112	72.72	154	89.53	172	38.22
1-3	10	8.47	26	24.07	82	75.93	108	91.53	118	26.22
≥3	7	4.38	7	4.38	146	95.42	153	95.63	160	35.56
LBW and normal birth weight - $\chi^2 = 34.14$ d.f.= 2, $p < 0.001$										

Table 2 : Iron and folic acid intake and pregnancy outcome

Iron and Folic Acid Intake	Still Birth		Live birth						Grand Total	
			Low Birth Weight		Normal Birth Weight		Total			
	No.	%	No.	%	No.	%	No.	%	No.	%
Regular (90-100 tab.)	1	2.22	4	9.09	40	90.09	44	97.78	45	10.00
Irregular	14	8.24	18	11.54	138	82.05	156	91.76	170	37.78
No tablets	20	8.51	53	24.65	162	73.35	215	91.49	235	52.22
Still births and live births- $\chi^2 = 2.80$, d.f.= 2, $p < 0.50$										
LBW and normal birth weight- $\chi^2 = 20.10$, d.f.= 2, $p < 0.001$										

Discussion: Antenatal care (ANC) is care given to a pregnant woman before delivery. The purpose of ANC is to prepare the mother for child birth in order to promote a favourable outcome for the mother and the child. While several studies suggest that certain components of ANC may have limited impact on reducing maternal morbidity and mortality, some of the dangers of pregnancy and child birth can be

avoided if the pregnant woman attends ANC.⁶⁻¹⁰

We observed that out of total 450 mothers studied, the outcome of 35(7.78 %) pregnancies was in the form of still births and 415(92.22%) of live births and among live births, 75(18.08%) babies were low birth weight. Gupta et al observed percentage of still birth in their study amounting to 1.8%.¹¹ But regarding low birth weight a similar finding was observed by Deswal et al.¹²

Regarding antenatal check up and pregnancy outcome, best pregnancy outcome was seen in mothers who had 3 or more checkups and in these mothers only 4.38 % pregnancies terminated in LBW babies. In contrast, in those mothers who did not undergo any antenatal check up, 27.27% mothers delivered LBW babies. The association between antenatal check up and frequency of LBW babies was highly significant statistically. Gawande et al (1994) obtained LBW proportion of 46.4 % in no care group, 40.9 % in inadequate care and 30.9% in adequate antenatal care group.² This difference was statistically significant. Das et al had also drawn similar conclusion.¹⁰ The impact of antenatal check up on pregnancy outcome may be due to the fact that antenatal checkups results in early detection of high risk cases and complications and their prevention or treatment. According to Celia A Brown et al, women attending for two ANC visits were more likely to have a healthy weight baby (OR 4.39; 95% CI 1.36–14.15).¹³

In our study, a highly significant statistical association was found between IFA intake and pregnancy outcome. Among the mothers who took full course of IFA tablets, 9.09% pregnancies terminated in LBW babies while in mothers who did not take any tablet, 24.65% pregnancies terminated in LBW babies.

During pregnancy the blood volume increases by 30%; 50 % increase in plasma volume and 18-25% in the red cell volume. This results in dilution of the red cells and a reduction in

haemoglobin concentration. The dilutional anaemia is further aggravated if the increasing demands of iron and folic acid during pregnancy are not met. IFA intake increases haemoglobin concentration, decreases anaemia and thus causes a reduction in abortions, premature births, still births and low birth weight babies. In our study 42% mothers were found to be anaemic. A highly significant association ($p < 0.001$) was found between maternal haemoglobin concentration and still births and highly significant association ($p < 0.001$) between maternal haemoglobin concentration and delivery of LBW babies.

With decrease in haemoglobin concentration, an increase in still births was observed. In mothers having normal haemoglobin, 4.60% pregnancies terminated as still births and 12.05% in the delivery of LBW babies, while in severe anaemic group 46.15% pregnancies terminated as still births and 71.42% ended in the delivery of LBW babies.

Deshmukh et al attained an odds ratio of 4.81 in anaemia with LBW babies.¹⁵ Naik et al and Anand et al also obtained a significant association of haemoglobin concentration with low birth weight babies.^{16,17}

Conclusion: Still births and LBW babies were high in mothers who did not go any antenatal checkup and relationship between iron and folic acid intake and pregnancy outcome in the form of LBW and normal birth weight babies was found statistically highly significant ($p < 0.001$). Iron and folic acid intake and antenatal care improved the pregnancy outcome significantly. The most powerful of all interventions, the 'key of key' is the education of the girls. Organizing access to antenatal care is potentially important since it also offers opportunities for counselling and risk detection. Operational strengthening and convergence of relevant programmes including the Reproductive and Child Health Programme, the Integrated Child Development Services

Original Article

Programme and Literacy Mission. Advocacy at the political level is needed to secure commitment, allocation of resources and appropriate policy development. Effective communication, empowerment of individuals and families through appropriate IEC is a critical need.

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An Analysis of Anthropometric Data and design of a Writing Desk for rural Bengalee Primary School Children

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Abstract

This study represents the results of an anthropometric survey conducted on Bengalee primary school boys with age range 6-9 years in the remote area of the city of Midnapore in Paschim Medinipur District, West Bengal. Anthropometric body dimensions were taken based on international standards. The sample consisted of 410 primary school boys. Means, standard deviations (SD), 5th, 50th and 95th percentiles were computed by using statistical package. It was observed from the results that all anthropometric dimensions of the primary school children were increased with their age. Moreover, there were little deviations between mean values of different anthropometric dimensions between the boys of 6 and 7 years ranges from 3.3-6.9 and only 3.3% to 7.6%. So, in the present study, the required anthropometric dimensions were collected from primary school boys having age range 6-9 years, and the suitable percentile values (5th, 50th and 95th) of anthropometric measures were computed and taken on account for designing a writing desk during sitting on the floor. The anthropometric databases of the present study may be helpful for designing school furniture and layout design of the classroom for the primary school children

Key Words: Anthropometric dimensions, primary school boys, percentile values, writing desk

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Introduction: A school is a second home for the children. Children spend a considerable part of their daily life in school. Children have to spend about 80% of their school time in the classroom performing various activities like reading, writing, drawing and other related activities, which requires them to sit continuously for long hours.^[1] In Western cultures students have traditionally been seated in a chair. When assumed for long periods of time, however, the standard chair-seated posture puts considerable stress on the lumbar

spine.^[2] The sitting position has been found to be the most troublesome situation in connection with low back pain.^[3, 4, 5] Postural complaints at primary school age are increasing significantly.^[3] Therefore, a human compatible working environment should be given because it enhances the attentiveness and satisfaction. Back pain is a significant burden of primary school children and if causes of back pain could be identified at an early stage the opportunity for remedial action would be improved. "Poor sitting habits" were statistically associated with low back pain.^[6] In a large number of rural primary schools in West Bengal state, students are not provided with bench and desk. They sit on the floor for attending the class. They sit on a typical Indian traditional sitting posture, i.e., sitting on the floor with folded legs. Sometimes the children stretch their legs while sitting on the floor. However, in other schools students use a unit of bench and desk for reading purpose. Sitting in the same posture for a long time causes an extremely undesirable physiological strain and the muscles, the ligaments, and the disc and that the situation is related to pain. However, when the children sat on the floor there was no question of fitting the furniture with body dimension of the user. They can sit freely on the floor. It gives the body a stable posture. Slightly forward or reclined sitting posture relieves the strain on the back muscles and

makes sitting more comfortable. Slightly forward bent trunk holds body weight in balance. But, during performing their activities, they have to adopt sharp forward bent posture. The backward rotation of the pelvis puts the spine into a state of more kyphotic and increases the pressure within the discs. Sitting in the same posture in a forward bending position for a long time puts an extremely undesirable physiological strain on the muscles, ligaments and in particular on the discs.^[7, 8] The children may feel discomfort/pain in different parts of the body especially at neck, thigh and lumber region and muscle fatigue also occurs. Hence, it is necessary that the school furniture should suit the requirements of school children.^[1] Keeping these facts in mind, only a desk may be placed in front of the student for writing and reading. Keeping above all facts in mind, if a suitable desk is placed in front of the student for writing and reading, they may overcome muscular as well as spinal stresses. As the elbows get support on the writing desk, the work surface come closer to the children, the lumbar and backbone move less forward in order to balance the force. As a result, backbone is about to drawn straight and the body will naturally sit up correctly. So, every effort should be made to ensure that young children do not experience back pain and other musculoskeletal disorders due to prolonged sitting on improperly designed classroom

furniture. This study proposes probable guidelines for the design of ergonomic-oriented classroom furniture for primary school children. Hence there may be the chances of improving posture and reducing the stresses during doing class work. A writing desk was designed on the basis of body dimension of the children as well as applying other ergonomic principles. The present investigation was aimed to design the proper writing desk for class room activities according to ergonomics point of view for the rural primary school children in the class room. The objectives of the present study were:

- 1) To assess of body dimensions of the school children and setting up an anthropometric database of the Bengalee school children (6-9 years of age) for the purpose of designing of school furniture.
- 2) To design a writing desk for comfortable and healthful seating of the school boys during attending classes and promotion of classroom activities by reducing body discomfort and awkward postures should be the ultimate goal of the present study.

Material and Methods:

Selections of site and subjects: The study was carried out in the 10 rural primary schools located at remote areas under Midnapore Sadar in West Midnapore District, West Bengal

during the period of 2009-2011 calendar years. For this study 410 primary school boys were selected at random. For the collection of required data, the approval was obtained from the school authorities before commencement of the study. The study was cross-sectional in nature and all subjects belonged to the Bengalee ethnic group. The age of the students were authenticated from the school records provided by the school authorities.

Measurement of Body Dimensions:

Different anthropometric measures of the school children were taken by adopting proper landmark definitions and standard measuring techniques.^[9, 10] The required equipments were

- 1) An anthropometer (Holtain),
- 2) A sliding caliper,
- 3) A steel tape.

The data recorded for a subject was the mean of three trials. All the measures were taken while subjects adopted traditional sitting posture. The following anthropometric dimensions were taken for this study:

Height (under traditional sitting): The vertical distance from the floor to top of the head was measured by an anthropometer.

Buttock - Knee length (under traditional sitting): Horizontal distance from the most posterior portion of buttock to anterior surface

of knee under traditional sitting was measured by shortened anthropometer.

Knee- to- knee distance under traditional sitting: The horizontal distance between two lateral most points of two knees under traditional sitting condition was measured by shortened anthropometer.

Elbow height from floor under traditional sitting: Vertical distance from floor to elbow was measured by anthropometer when fore arm is placed horizontally with floor and forms angle with the upper arm.

Elbow to elbow length in writing position (under traditional sitting): Horizontal distance across the lateral surfaces of the elbows (when children used to write on the floor/desk), was measured by shortened anthropometer.

Knee height under traditional sitting: The vertical distance from the floor to top surface of the bent knee under the traditional sitting was measured by shortened anthropometer.

Arm reach under traditional sitting: The horizontal distance between the maximum bulges of the body posteriorly and dactylion III was measured by an anthropometer.

Span of arms flexed at the elbows (*Spine Akimbo*) under traditional sitting: The horizontal distance between the olecranon on either side. The elbows were placed at the level of the shoulders and touch the center of the wall of the stand.

Percentile values of anthropometric dimensions of the user

For selecting design dimension of the school furniture and classroom layout, different percentile values of the measured body dimensions of the students were calculated. Three percentile values, 5th, 50th and 95th, for each body dimension were computed with the help of standard statistical packages.

Anthropometric survey: Optimal furniture design recommendations are often based on the relationship of the furniture dimensions with the anthropometrics of the seated person. The most of the primary schools are situated in rural and semi-urban areas where the school authority is unable to provide such furniture because of financial paucity. If prolonged sitting at school furniture is a risk factor for the development of musculoskeletal symptoms, and there exists an optimal relationship between the anthropometric dimensions of the student population and the dimensions of the fixed. Therefore, a human compatible working environment should be given because it enhances the attentiveness and satisfaction. Anthropometry is a research area in ergonomics dealing with the measurement of human body dimensions and certain physical characteristics [11, 12]. Therefore, the effect should be done to design low cost writing desk according to the anthropometric considerations.

Result and Discussion: The mean values are represented in Table-1 under traditional sitting posture, i.e., sitting on the floor with folded legs. Table-1 reflects that all anthropometric dimensions of the school children increased with increment their age. With the increase of age, development of skeletal system, muscular system, and other systems of the body occurs, and therefore the resultant effect anthropometric measures increase.

Table-1: Mean±SD of different anthropometric body dimensions under traditional sitting posture.

Dimensions (under traditional sitting) (cm)	Age groups			
	6 years (n=101)	7 years (n=102)	8 years (n=103)	9 years (n=104)
Sitting height	54.98±3.92	56.07±3.95	63.12±5.60	66.40±5.63
Buttock - Knee length	27.28±3.24	31.06±3.25	35.36±5.39	38.22±5.93
Knee- to- knee distance	37.21±3.26	41.30±4.18	45.63±5.43	49.49±5.60
Elbow height from floor	17.53±2.50	17.58±2.88	21.28±2.03	24.14±3.17
Elbow to elbow length in writing position	30.03±3.27	35.44±3.32	35.12±5.14	36.55±5.18
Knee height	10.35±1.70	11.11±2.07	13.33±2.17	14.82±2.86
Arm reach	49.48±1.98	50.75±3.84	52.45±3.07	53.93±3.53
Span of arms flexed at the elbows (SpineAkimbo)	54.65±3.23	56.73±5.21	62.34±3.89	64.80±4.83

During designing any furniture for any individual, the individual body dimensions are used. But for mass production, the percentile values of body dimensions of mass population have been used. The reliable anthropometric data for a target population were necessary when designing for that population otherwise the product may not be suitable for the user.^[13] Here 5th, 50th and 95th percentile values of different body dimensions are computed for

designing of writing desk. A 95th percentile value of a body dimension would indicate that 95 % of the study population have the same or less body dimension, and only the remaining 5 percent of the population have greater values and for the 5th percentile value indicate the opposite. The 50th percentile value represents closely the average, which divides the whole study population into two equal halves.

The percentile values of different physical dimensions of primary school children are presented in Table-2 and Table-3. The computed values of 5th and 95th percentiles were used for designing of writing desk.

From the Table 2, it is observed that mean differences (%) of anthropometric dimensions between the primary schoolboys of 6 and 7 years ranges from 3.3-6.9%. It was also noted that mean differences (%) of studied anthropometric dimensions of primary schoolboys of 8 and 9 years (Table-3) are low (only 3.3% to 7.6%). From the above observation, it may be stated that both age groups of Bengalee primary school population had no such notable changes in their body dimensions. Therefore, the boys of four age groups are merged together and may be considered as a single group while selecting design dimensions for the school furniture.

Table 2: Mean \pm S.D., and percentile values of different anthropometric dimensions of schoolboys of different age groups

Dimensions (under traditional sitting) (cm)	6 years	7 years	Mean diff. (%)	Grand Mean and SD	Percentiles		
					5th	50th	95th
Sitting height	54.98 \pm 3.92	56.07 \pm 3.95	5.4	55.6 \pm 4.1	53.0	55.6	57.2
Buttock - Knee length	27.28 \pm 3.24	31.06 \pm 3.25	4.6	30.7 \pm 3.7	29.0	30.7	32.3
Knee- to- knee distance	37.21 \pm 3.26	41.30 \pm 4.18	5.8	39.4 \pm 2.9	37.8	39.4	41.0
Elbow height from floor	17.53 \pm 2.50	17.58 \pm 2.88	3.8	17.3 \pm 4.5	15.6	17.3	18.9
Elbow to elbow length in writing position	30.03 \pm 3.27	35.44 \pm 3.32	7.6	32.9 \pm 4.2	31.3	32.9	34.5
Knee height	10.35 \pm 1.70	11.11 \pm 2.07	5.3	11.0 \pm 2.7	9.3	11.0	12.6
Arm reach	49.48 \pm 1.98	50.75 \pm 3.84	3.3	49.9 \pm 1.7	48.3	49.9	51.5
Span of arms flexed at the elbows (Spine Akimbo)	54.65 \pm 3.23	56.73 \pm 5.21	6.9	55.6 \pm 3.7	53.9	55.6	57.2

During design of a writing desk for the primary school boys, the anthropometric design principle should be applied. Anthropometry is a research area in ergonomics dealing with the measurement of human body dimensions and certain physical characteristics.^[11, 12] So, consideration of different anthropometric dimensions of the primary school boys is essential during selection of dimensions for designing of classroom furniture. The important dimensions for the designing of a writing desk and the relevant user dimensions are shown in Table-5.

The width of the writing desk corresponds to the elbow to elbow distance (writing condition) of the population during sitting condition.^[14] The 95th percentile value is considered in the case of width of fixed writing desk (Fig-1), the

design compromise should be directed well towards the larger user which is considerably greater than the elbow to elbow distance. This may provide extra space for performing works on the desk surface.

For the determination of work surface height, the data of elbow height of the user were used.^[15] Therefore, data of sitting elbow height from the floor collected from this study might be used for the determination of height of the working surface (desk) for seated children (Fig-1). The design compromise should be directed well towards the smaller user, because large users are not greatly discomforted by desk height which is considerably less than the length of their floor to elbow height.

Conclusion: The results of this study show that the anthropometric data of pupils in primary schools were probably not used when designing the furniture currently in use. While some of the dimensions were low, others were high for the primary school pupils. It is important that if products are to be designed, they should be based on the anthropometric dimensions of the user population to reduce negative effects on the muscle due to poor sitting postures and also reduce neck, shoulder and back pain that may result. The study also provides some additional anthropometric data that may be useful in the design of other products for pupils in primary schools.

Table 3: Mean ± S.D., and (ranges) of different anthropometric dimensions of schoolboys of different age groups.

Dimensions (under traditional sitting) (cm)	8years	9 years	Mean differences (%)	Grand mean and SD	Percentiles		
					5th	50th	95th
Sitting height	63.12±5.60	66.40±5.63	6.6	65.3±3.9	63.6	65.3	66.9
Buttock - Knee length	35.36±5.39	38.22±5.93	4.8	36.7±4.6	35.0	36.7	38.3
Knee- to- knee distance	45.63±5.43	49.49±5.60	8.2	48.6±3.4	46.9	48.6	51.9
Elbow height from floor	21.28±2.03	24.14±3.17	5.9	22.7±2.9	21.0	22.7	24.3
Elbow to elbow length in writing position	35.12±5.14	36.55±5.18	3.7	32.0±1.6	30.3	32.0	33.6
Knee height	13.33±2.17	14.82±2.86	4.5	13.7±3.9	12.0	13.7	15.3
Arm reach	52.45±3.07	53.93±3.53	3.3	53.0±2.4	51.3	53.0	54.6
Span of arms flexed at the elbows (Spine Akimbo)	62.34±3.89	64.80±4.83	4.3	63.6±3.1	62.0	63.6	65.2

Table-4: Mean, SD and percentile values of physical dimensions for designing writing desk.

Parameters	Mean ± SD	5th percentile	50th percentile	95th percentile
Sitting height	60.14±6.80	58.50	60.14	61.79
Knee-knee Dist, sitting	46.61±6.67	44.96	46.61	48.25
Elbow to elbow Dwastance (writing condition)	34.28±4.99	32.64	34.28	35.93
Floor-elbow height, sitting	24.77±2.09	21.33	24.77	28.20
Length of note book	31.06±1.59	29.42	31.06	32.71
Arm reach, sitting	51.65±3.59	50.01	51.65	53.30
Knee depth, sitting	8.13±1.64	6.48	8.13	9.77
Spine akimbo, sitting	59.63±5.98	57.98	59.63	61.27
buttock-knee length, sitting	33.93±8.35	32.28	33.93	35.57
Length of note book,	31.06±1.59	29.42	31.06	32.71

Table 5: Criteria for selecting the dimension of the desk

Anthropometric /other dimensions	Dimensions for writing desk.	Selected percentile	Value of the selected percentile (cm)	Clearance (cm)	Final dimension
Elbow to elbow Distance(writing condition)	Width of the writing desk	95th	35.93	2.0	38.0
Floor-elbow height, sitting	Height of the writing desk	5th	21.33	0	22.0
Length of note book	Depth of the writing desk	95th	32.71	2.0	35.0

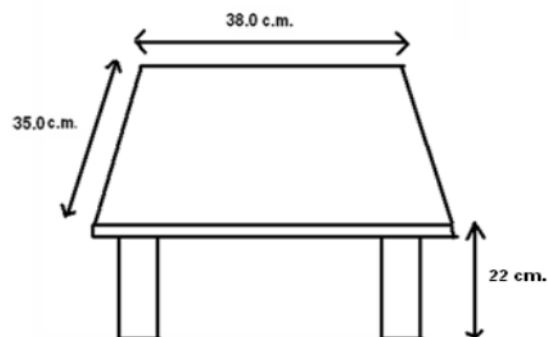


Fig-1: Recommended dimensions of writing desk

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Diversity of Oral Microflora in children of age group 6-12years in Pedodontics Department of RCDSR

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Abstract

A comparative study of oral microflora in children of age group 6-12 years in Pedodontics department of RCDSR was carried. It resulted in microflora common in all types, gram positive facultative anaerobic rods and cocci. In normal children gram positive facultative anaerobic and fermenting cocci were predominant where as in children with caries growth of microbiota that were gram negative and positive, capnophilic, motile and anaerobic rods and cocci belonging to members of genera *Streptococcus* and *Actinomyces* was seen. But in patients with caries above age of 9 yrs there was subsequent increase in gram negative, obligate anaerobic, proteolytic, motile bacterial species. Numerous oral changes were seen in caries patients including alterations in the flora of oral cavity, greater predominance of *Hemolytic Streptococci*, *Lactobacillus* and *Staphylococcus*. Total bacterial loads were more in caries patients aged above 9-12 yrs than the microflora in normal children. Caries increases the risk and severity of periodontal diseases. Proportion of different periodontal pathogens was more in patients with caries.

Key Words: Oral, microflora, caries, periodontitis, micro-organisms

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Introduction: The mouth is one of the key interface between the body and the external environment and can act as a site of entry for some microbial pathogens especially from the air or via ingestion from the diet, therefore it is equipped with a comprehensive array of defence strategic that includes elements of both the innate and adaptive immune system. The ability of the host is to recognize and respond to invading pathogens while simultaneously tolerating a diverse resident microflora.^[1,2,3]

The human body is made up of over 10 cells which around 10% are mammalian. The remainder are the micro-organisms that comprise the resident microflora of the host. This resident micro-organism does not have merely a passive relationship with its host but contributes directly and indirectly to the normal

development of the Physiology, Nutrition & Defence system of the organism.^[4,5]

The mouth is the gateway of the body to the external world and represents one of the most biologically complex and significant sites in the body.^[1,6] Recent studies have re-affirmed an earlier concept that oral health is inextricably linked to general health, and vice-versa maintaining a healthy mouth therefore is of vital importance for a person's self-esteem and general well-being. The oral cavity is the most complex and the most accessible microbial ecosystem of the human body. The teeth gingiva (gums), tongue, throat and buccal mucosa (cheeks) all provide different surface for microbial colonization.^[5,6] The intermittent provision of sugar and Amino acid from

ingested food provide nutrients for microbial growth^[3,7,19].

The human oral cavity is home to about 700 identified species of bacteria. It is home to fungus mainly of genera *Candida*, several species of protozoa which graze on bacteria for food and various intercellular viruses.^[8,9]

Bacteria that first colonize salivary pellicle present on the tooth surface are mainly *Streptococcus* (*Str. oralis*, *Str. mitis*, *Str. sanguis*, *Str. parasanguinis*, and *Str. gordinii*). In addition, *Actinomyces*, *Veillonella*, *Gemelia*, *Abiotrophia* and *Granuliscanella* are usually detected.^[9-13] WD Miller, an American Microbiologist was able to observe oral bacteria within tissues in particular *Streptococcus* penetrating the tubules of dentin. The acquisition of the oral microflora continues to change with age following tooth eruption, the isolation frequency of micro-organisms especially black-pigmented anaerobes increases.^[12,13]

Dental caries is the single most common chronic childhood disease.^[13,18,21] Both caries and Periodontal disease are for the most part acquired and preventable disturbances of the teeth and jaws.^[15,16,18] Studies by Orland and by Fitzgerald, Jordan and Achard demonstrated that Dental caries will not occur in the absence of micro-organisms. Animals maintained in a germ free environment did not developed caries even when fed a high carbohydrate diet.^[19,20]

A number of micro-organisms can produce enough acid to decalcify tooth structure, particularly aciduric *Streptococci*, *Lactobacillii*, *Diphtheroids*, *Yeast*, *Staphylococcus* & certain strains of *sarcinae*. Loesche concluded in his work that evidence suggests that *Str. mutans*, *Str. sorbius* & *lactobacilliare human odontopathogens*.^[23]

Wan et al reported *Str. mutans* colonization in infants as young as 3months - 2years of age.^[13,14,,24,25,26] Investigations by Davey and Rogers and by Berkiwitz and Jones have confirmed that *Str. mutans* is transmitted orally from mother to infants.^[27,28] Brown, Junner

and Iiew have demonstrated a relationship between the numbers of *Str. mutans*. present in the mother and infants. Their findings also showed that children who carried *Str. mutans* at 3years of age had caries.^[13,14,29]

Material and Methods: The study was carried out following the proper guidelines of the ethical committee of the Institute. Total 50 patients of age group 6-12 yrs were analyzed for their oral microflora.

COLLECTION OF SAMPLE:

The samples were taken by swabbing the oral cavity by rotating the sterile swab and where it had limitations, dental probes and scalers were used. Each sample was collected in 5ml of Thioglycollate broth media, vortexed with small, sterile glass bead.^[8,11,12,31,33,34]

CULTIVATION:

The samples that were collected were incubated at 37°C for 48 hrs. Once dispersed samples were taken and Gram staining was done, also they were spread on to a number of freshly prepared agar plates and incubated to allow cells to form microbial colony.

MEDIA USED

1. Nutrient agar (Basal Media) – was used as basal media for all aerobes, also to check pigment production
2. Blood Agar (Enriched Media) - to check hemolytic property of the bacteria like *Streptococcus*, *Staphylococcus*, *Enterococcus*, *Pseudomonas*, *Actinomycetes*, *Fusobacteria*, *Eubacterium* and *Porphyromonas*
3. Vancomycin + Blood agar- For Strict anaerobes – *Bacteroides*, *Fusobacterium*, *Porphyromonas*

4. Robertson Cooked Meat Media (Anaerobic media)-to check proteolytic or saccharolytic activity
5. Sabourauds Media- for candida albicans
6. Trypticase Soy Agar- For anaerobes – Bacteroides, Fusobacterium, Porphyromonas, Enterococcus, Eubacterium, Pseudomonas
7. Anaerobic Agar Media – basal media for all anaerobes
8. Thioglycollate – for sample collection & transportation
9. MacConkey Agar – for Streptococcus, Staphylococcus, Enterobacters, Pseudomonas

The above agar plates were inoculated by streak method and aerobes were subjected for incubation at 37°C for 24 hrs, the anaerobes were kept in the McIntosh Jar and incubated at 37°C for 48 hrs. After incubation period of 24-48 hrs the colonies were identified by colony morphology, Gram Staining & Biochemical reactions. [12,30,31,32,33,34] The various microflora were identified by the hemolytic zones & pigmentation on blood agar, pigment production on Nutrient Agar and Biochemical reactions such as IMViC Test, Fermentation test and other specific test (oxidase test, gelatin liquefaction, catalase test) were performed for identification of microbes are presented in Table No.1

For the organisms where fermentation and IMViC test was limitations, other specific tests such as Bile test, Esculin test, also germ tube test for identification of candida was performed.

ENUMERATION & IDENTIFICATION:

The samples were streaked with inoculating loop to produce isolated colonies. The colonies were counted and their concentration in the original sample was expressed as colony forming unit (CFU) by using colony counter

(Hi-Media- LA660). Representative was sub-cultured to check for purity and for subsequent identification. This method also involves identifying 30-50 random colonies. [8,11,12,,31,32,34]

Result & Discussion: Fewer coccal cells, more motile rods were found in diseased sites, but there was rise in Gram Negative Bacteria in children with caries. [6] Cultivation of micro-organism from sites of caries reveals high percentage of anaerobic bacteria and Gram negative bacterial species. [8, 9] Numerous oral changes were seen in caries patients such as predominance of *Candida albicans*, *Hemolytic Streptococci*, *Staphylococci*, *Porphyromonas gingivalis*, *Actinobacillus actinomycetecomitans*. The number of bacteria determined by microscopic counts was twice as high in caries patients as in healthy sites. Microflora common in all types were gram positive facultative rods and cocci. Early studies with appropriate microscopy clearly demonstrated that the number & proportion of different subgingival bacterial groups varied in periodontal health compared with the disease state. [15,16]

The intermittent provision of sugar and Aminoacid from ingested food provide nutrients for microbial growth. [3,19] The presence of nutrients, epithelial debris, and secretions makes the mouth a favourable habitat for a great variety of bacteria. The oral bacteria exert microbial antagonism against non indigenous species by production of inhibitory substances such as fatty acids, peroxide and bacteriocins. Oral health is inextricably linked to general health, and vice-versa maintaining a healthy mouth therefore is of vital importance for a person's self-esteem and general well-being.

Table 1: Biochemical reactions as shown by various oral micro-biota

Oral Microflora	Hemolytic (blood agar)	Indole	MR	VP	Catalase	Nit redn	Gelatin	Coagulase	Oxi	G	L	S	M i	M ii
Streptococcus	-	-	+	+	-	+	+	-	-	-	+	-	+	+
Staphylococcus	Beta	-	+	+	+	+	+	+			-		-	+
Enterococcus	Cream	*	*	*	-	*	*	*	*	*	*	*	+	*
Enterobacters	-	+	-	+	+	-	-	*	-	+	+	+	+	+
Pseudomonas	+	-	-	-	+	+	+	*	+	-	-	-	+	-
Lactobacillus	-	*	*	*	-	*	*	*	*	*	*	*	*	*
Actinomycetes	-	*	*	*	*	+	*	*	*	+	-	+	+	+
Bacteroides	Grey	+	*	*	+	-	*	*	*	*	*	*	*	*
Fusobacterium	-	+	*	*	-	-	*	*	*	*	*	*	*	*
Eubacterium	Grey	+	*	-	*	-	*	*	*	*	*	*	*	*
Porphyromonas	Black pigment	+	*	*	*	*	*	*	*	-	-	-	-	-
Candida	----	*	*	*	*	*	*	*	*	+	*	+	*	*

MR-Methyl Red, VP- Voges Prausker, Nitr- Nitrate, Oxi- oxidase, G-Glucose, L-Lactose, S-Sucrose, M i – Mannose, M ii – Mannitol, *-- no test.

Table 2: Types of Oral Microflora in different groups of patients

Oral Microflora	6-8 years	9-12 years
Streptococcus*	++	+++
Staphylococcus	++	+++
Enterococcus	+	++
Enterobacteriaceae	+	++
Pseudomonas	+	++
Lactobacillus*	++	+++
Actinomycetes*	++	+++
Bacteroides	+	+++
Fusobacterium	+	++
Eubacterium	+	+++
Candida*	++	+++
Gram Positive Bacilli*	++	+++
Porphyromonas*	+	++

++++ = nearly 100 % ++ = nearly 50% + = common (about 25 %) +/- = rare (less than 5%) * = potential pathogen

Table 3: Gram reaction shown by various microflora

Oral Microflora	Gram Reaction	Morphology	Arrangement
Streptococcus	Gram +ve	Coccus	Small chains
Staphylococcus	Gram +ve	Coccus	Clusters
Enterococcus	Gram +ve	Coccus	Single/ short chain
Enterobacteriaceae	Gram -ve	Bacillus	Single
Pseudomonas	Gram -ve	Bacillus	Single
Lactobacillus	Gram +ve	Bacillus	Single
Actinomycetes	Gram +ve	Bacillus (Straight or curved with rounded ends)	Straight or curved with rounded ends
Bacteroides	Gram -ve	Bacillus	Single

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Effect on Autonomic Nervous System in Smokers and Non Smokers- A Comparison Study

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Abstract

Smoking is one of the most ancient and wide spread human activities. Tobacco is a major cause of death worldwide. Cigarette smoke components are mainly carbon monoxide, carbon dioxide, nitrogen oxides, ammonia, volatile nitrosamines, hydrogen cyanide, volatile sulphur containing compounds, volatile hydrocarbons, alcohols, aldehydes and ketones. Some of these compounds affect ciliary movement in the lungs and autonomic nervous system. Habitual cigarette smoking affects respiratory system and cardio vascular system through autonomic nervous system. So we conducted a study to compare the smoking effect on autonomic nervous system in smokers and non-smokers. We found that Pulse Pressure, Systolic and Diastolic BP (Hg) was significantly higher in smokers as compared to non smokers. Respiratory Rate (RR) and Peak Expiratory Flow Rate (PEFR) were lower in smokers as compared to non smokers, the difference being statistically significant. Significant increase in diastolic blood pressure in habitual smokers with isometric hand grip exercise test was found indicating movement of sympathetic nervous system. The RR and PEFR were lower in smokers than the non smokers indicating Chronic Obstructive Pulmonary Disease.

Key Words: Autonomic nervous system, smoking, respiratory rate, chronic obstructive pulmonary diseases.

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Introduction: Smoking is one of the most ancient and wide spread human activities. Tobacco is a major cause of death worldwide. Long term smoking induces down regulation of the beta adrenergic receptors. Plasma catecholamine levels are significantly higher in smokers than non-smokers as explained by beta blockers which are less effective in the treatment of hypertension in smokers as compared to nonsmokers.¹ Such observations indicate that cigarette smoking might induce a beta adrenergic tone with considerable impact on cardiovascular regulations. Further these results imply that even if beta receptor function per second is unaltered in cigarette smokers their down regulation of beta receptor

results in relative increase in alpha adrenergic tone at any given catecholamine concentration. A decrease in PEFR in smokers significantly increases progressive deterioration of the lung functions and is a risk factor in chronic obstructive pulmonary disease, in which pulmonary mechanism deteriorates and causes loss of elastic recoil of the lungs and slows down the forced expiration with nicotine, and causes the mucus-producing cells to grow in size and number. Mann et al compared office and 24 hour ambulatory blood pressure of 59 untreated hypertensive smokers with 118 hypertensive non smokers matched for age, sex and race and concluded that among the white hypertensives aged above 50 years, smokers

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maintained higher day time ambulatory systolic blood pressure than non smokers.² It has been concluded that tobacco users show an increased heart rate and blood pressure with a tendency towards greater overall cardiovascular effects as compared to non tobacco users.³ It has been also reported that smokers have lower blood pressure than non smokers. This negative relationship between cigarette smoking and the blood pressure is probably due to reduced stroke volume.⁴ With this background we conducted a study to compare the smoking effect on autonomic nervous system in smokers and non-smokers.

Material and Methods: The present cross sectional study was carried out in the Department of Physiology at Ganni Subba Laxmi Medical College and General Hospital, Rajahmundry, Andhra Pradesh from 2008 to 2009 after approval of institutional ethical committee. About 83 male individuals were randomly selected from the Medicine outdoor department of the hospital out of which 59 were habitual cigarette smokers who consumed at least 10 cigarettes per day and 24 were non smokers of age ranging from 20 to 50 years. A structured performa was designed to evaluate and record the personal data of the selected subjects regarding their name, age, sex, height and weight, personal history like smoking, with duration and quantity, any history of lung disease, history of persistent cough etc. Individuals with history of hypertension, allergy and diabetics, autonomic dysfunctions were excluded. For each subject (both smoker and non smoker) the respiratory rate (cycles/min), heart rate (beats/min) and blood pressure using sphygmomanometer was recorded.

The parasympathetic activity was assessed by heart rate response to Valsalva manoeuvre. Each subject was told to perform Valsalva manoeuvre for 15 seconds by blowing into a mouth piece attached to a sphygmomanometer and maintain a pressure of 40 mm Hg for 15sec. Three trials were performed

at intervals of 5 minutes. A continuous ECG was recorded 1 minute before the maneuver (resting period), during maneuver (strain period, 15 seconds) and 60 seconds subsequently after the strain period. Valsalva ratio was taken as the maximum ratio of maximum R-R interval after the strain to that of shortest R-R interval during the strain.

$$\text{Valsalva ratio (VR)} = \frac{\text{Maximum R-R Interval after maneuver}}{\text{Shortest R-R Interval during maneuver}}$$

The sympathetic activity was assessed by blood pressure response to sustained hand grip. The subject was asked to sit comfortably in chair. Initially the subject was asked to exert maximal strength on hand grip dynamometer with right hand. First the maximum voluntary contraction (MVC) was determined and then the subject was asked to exert 30% of MVC for 5 minutes with right hand. Diastolic blood pressure was measured in left hand at rest and at 1 minute interval during handgrip. The maximum rise of diastolic pressure during 30% of MVC over the resting diastolic blood pressure was noted.

Peak Expiratory Flow Rate (PEFR): It is the maximum velocity (liters/minute) with which air is forced out of the lungs in a single forced expiratory effort. The subject should be in sitting position; nose closed with the help of clip and should take a deep breath and then place the mouth piece. The subject should then blow out as hard as possible in a short sharp blast. Three readings were taken after an adequate period of rest between each attempt. The maximal values were taken. The data was statistically analyzed using the SPSS software (version 12.0) and by applying Student's t-test.

Result: Table-1 shows the anthropometric parameters of smokers and non-smokers. There was no significant difference in their age, weight and BMI. Table-2 shows that the Pulse, DBP, MAP, RR (Shortest), RR interval Shortest (sec) and RR ratio in smokers was high as compared to non smokers, the difference being statistically insignificant. RR longest, RR interval (sec) in smokers was lower as compared to non smokers and was not significant. SBP in smokers was significantly higher as compared to non smokers.

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PP, SBP (Hg) and DBP (Hg) in smokers was significant higher as compared to non smokers. Respiratory rate and PEFR in smokers was low when compared to non smokers, the difference being statistically significant.

Table-1: Anthropometric parameters of smokers and non-smokers

Anthropometric parameters	Smokers (n= 59) Mean ± SD	Non Smokers (n= 24) Mean ± SD	p value
Age(Yrs)	36.47±8.12	35.33±7.18	0.55
Weight(Kg)	68.51±9.99	66.75±10.19	0.47
Height(m)	1.69±0.08	1.69±0.10	0.86
BMI(Kg/m ²)	24.04±3.84	23.53±4.05	0.59

Table-2: Affect of parameters on the autonomic nervous system of smokers and non-smokers

Parameters	Smokers (n= 59) Mean ± SD	Non Smokers (n= 24) Mean ± SD	p value
Pulse rate	76.63±5.55	72.08±4.62	0.00
SBP (mmHg)	129.66±10.94	121.83±6.70	0.00
DBP(mmHg)	85.32±6.91	78.58±5.79	0.00
PP(mmHg)	44.34±6.70	43.25±4.04	0.46
MAP(mmHg)	100.10±7.86	93.00±5.81	0.00
Resp. rate	15.31±3.00	12.54±1.79	0.00
PEFR(L/M)	359.15±83.61	419.17±68.65	0.00
RR longest	19.17±3.24	22.00±2.78	0.00
RR Interval longest(sec)	0.77±0.13	0.88±0.11	0.00
RR shortest (sec)	17.95±3.12	15.58±3.16	0.00
RR Interval Shortest (Sec)	0.72±0.12	0.62±0.13	0.00
RR ratio	1.07±0.16	1.47±0.13	0.00
SBP (Hand grip)	139.66±12.76	131.25±8.15	0.00
DBP (Hand grip)	97.42±7.67	93.00±8.17	0.02

Discussion: The present cross sectional study was carried out in 59 habitual smokers and 24 non smokers who served as controls for testing autonomic functions. Evaluation of status of autonomic nervous system was done with the help of two non invasive tests like Valsalva maneuver and sustained hand grip. Our study is almost related to the study of Ewing et al who observed that during sustained hand grip, there was a sharp rise in diastolic pressure due to increase in peripheral vascular resistance.⁵ Our results revealed a significant rise in blood pressure in smokers as compared to non smokers. This is in accordance with the observations reported by previous studies⁶⁻¹⁰. Benowitz et al conducted a study among smokers and nicotine gum users and concluded that prominent cardiovascular effects of nicotine were result of activation of sympathetic nervous system increasing heart rate and blood pressure.³ Grassi et al reported the mechanism responsible for sympathetic activation due to cigarette smoking was associated with plasma catecholamines suggesting an adrenergic stimulation.⁸ In our study also there is an increase in blood pressure in smokers as compared to non smokers which could be explained due to increased sensitivity of sympathetic nervous system due to the stimulating tests (Sustained Hand grip). Gerhardt et al studied the effects of smoking on baroreceptors in smokers and reported an increased blood pressure among them as compared to non smokers.¹⁰ These findings are similar to our results. The present study revealed a significant decrease in PEFR in smokers as compared to non smokers. Suzuki et al also concluded that smokers had lower PEFR as compared to non smokers.¹¹ This reflects the strength of the ventilating muscle and diameter of the respiratory duct.

Conclusion: Habitual cigarette smoking affects respiratory system and cardio vascular system through autonomic nervous system. Our

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observations revealed that there was a significant increase in diastolic blood pressure in habitual smokers with isometric hand grip exercise test indicating movement of sympathetic nervous system. Respiratory rate and PEFr was lower in smokers as compared to the non smokers indicating Chronic Obstructive Pulmonary Disease.

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