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ORAL HEALTH

The WHO has assigned the theme for the World Health Day for 1994 as "oral health for a healthy life", the focus being on the health workers as well as the general public in stressing the importance of oral health.

The mouth or the oral cavity contains several important organs such as the teeth, tongue, palate, gums, pharynx and salivary glands. It is the portal of entry for food and the site where the digestion of the food commences. It carries the important sensory organ *viz.* the taste buds which are capable of differentiating different tastes. The teeth, the tongue and the cheeks together aid the grinding of the food into a paste to facilitate propulsion into the food pipe. The oral cavity aids articulation of the sound produced by the larynx into speech. It is the alternate respiratory pathway, when for any reason, the nasal passage gets blocked even partially. It also provides shape to the face and gives it the distinct human form. A good set of clean, even white teeth symmetrically placed is an asset.

From ancient times, physicians have recognised that the oral cavity is a sensitive indicator of the general health and nutritional status of the individual. Thus the earliest signs of anaemia and vitamin B complex deficiencies can be observed in the mucosa of the oral cavity. Further, the oral cavity is readily accessible to the physician for inspection and diagnosis. Several disease processes leave their indelible imprint in the oral cavity, as for example the lead lines in lead poisoning and dental mottling in dental fluorosis which are but two instances where the physician gets valuable leads for diagnosis by just examining the mouth. Oral cavity always harbours microbes; in health, these microorganisms are kept in check by the normal host defense mechanisms. However, once the immune mechanism breaks down, the pathogenic and opportunistic infections can take over and lead to severe infection. In the past, such severe forms of oral sepsis were seen in severely malnourished children. Today, such severe repeated infections may indicate the first sign of AIDS in adults as well as in children.

Early diagnosis at the onset of a disease process in the oral cavity should not be difficult because of the easy accessibility of the various organs located in the oral cavity for visual inspection, soon after the occurrence of symptoms like pain or burning sensation leading to loss of functions (*eg:* inability to eat or speak) and/or halitosis. At this stage, it is possible to diagnose and treat the condition with total recovery. It is paradoxical, however, that usually diseases of the oral cavity are the most neglected and medical help, is sought only when symptoms like pain become unbearable. It is not unusual to find persons with bleeding gums or even a large epithelioma of the oral cavity not seeking medical help, because it is not considered a life threatening, condition and most individuals choose to put up with a little inconvenience in the hope that the condition will get rectified by itself. Chronic sepsis in the mouth, apart from local pain and foul breath and subsequent loss of dentition, can be the root cause of arthritis and even amyloidosis.

Division of Publication & Information, ICMR, New Delhi - 110 0

In view of the foregoing, it is very essential that the community is educated and made aware of the importance of oral hygiene and also to seek medical help whenever signs or symptoms occur in the oral cavity. For this purpose, three basic measures are obviously required:- First, the methods to educate the population about the importance of oral health and as to how oral health is feasible, mostly through self care. The second, to examine whether such health education can be given as part of the primary health care, and if so, what additional skills are to be imparted to the health worker and what type of referral back-up services need to be set up. Thirdly, it is important to undertake steps to make the costs of treatment affordable. Studies carried out by the Indian Council of Medical Research (ICMR) have examined all these issues. Apart from studies in dental caries, the studies in RF/RHD (rheumatic fever/ rheumatic heart diseases) and oral cancer have all shown that primary prevention is crucial and feasible in all these conditions. The seventh plan initiatives by ICMR have addressed all these components.

Highlights of the work carried out under the auspices of ICMR and their research outcome are presented here:

Dental Health

Dental caries

The prevalence of dental caries in India is on the increase. The estimated point prevalence in the forties was about 55.5 per cent, with an average DMFT (decayed missing and filled teeth) of about 0.06. It was reported to be 68 per cent with a DMFT of 2 in the fifties. In the eighties it has been estimated[1] to be over 80 per cent with a DMFT of 4. While poor oral hygiene is an important cause of high caries rate, another equally important cause is the change in lifestyles—particularly in the dietary habits *ie* use of more refined carbohydrates and increased intake of sugar.

Fluoridation of drinking water has been used as the public health measure against dental caries in many developed countries, as it is considered safe, economical and practical and the results are predictable. A fluoride concentration of about 1 ppm is optimum for controlling dental caries and is well within the limits of safety. However, this measure is not practical or feasible in India for obvious reasons. Firstly, water supply is still far from satisfactory even in urban areas and there is no semblance of organised potable water supply system in

Excerpt from the Message of Dr. Uton M. Rafei,
Regional Director
WHO South-East Asia Region
on the Occasion of World Health Day 1994

While significant progress has been achieved in oral health in most developed countries following sustained prevention programmes, the situation in some developing countries is causing concern as oral diseases are showing an increasing trend. While some diseases like oral cancer kill, people with AIDS,tuberculosis, syphilis, leprosy and herpes also have oral problems and conditions that require care.

Most Member Countries of WHO's South-East Asia Region are fortunate that only moderate to low levels of dental problems are found in children as compared to children in some developed countries. What is needed urgently, therefore, is to ensure that this situation is further improved through appropriate preventive programmes launched with and sustained through community support.

As the WHO Director-General, Dr. Hiroshi Nakajima, has said, "We must ensure that the adoption of the new lifestyles and new eating habits does not lead to an increase in dental caries in populations that always had healthy teeth. We must find ways of incorporating and encouraging traditional methods of oral hygiene which have proved their efficacy, and which are inexpensive and culturally acceptable".

most of the rural areas. For fluoridation to be adopted as a public health measure, a centrally controlled piped water supply system is mandatory, as a prerequisite. Moreover, several parts of the country are endemic for fluorosis and in such areas defluoridation of water is a dire need. For this reason, the standard practice of controlled fluoridation of drinking water as a prophylactic procedure to prevent dental caries is not feasible in India, in the near future.

> Success in vastly improving oral health for whole populations has been the outcome of the dental profession's activities in highly industrialized countries and in several countries where the economy is either in transition or developing. That success has been achieved by a large range of preventive programmes based on improved oral hygiene, optimal use of fluorides and prudent use of sugars, complemented by curative, restorative and rehabilitative services (WHO. WHD 94.8).

In places where there is no piped water supply, topical application of fluoride has been shown to be effective in checking dental caries[2,3]. It is therefore logical to presume that topical fluoride along with good oral hygiene can offer a practical solution for the prevention of dental caries in India. An ICMR Task Force project on a "feasibility module for the primary prevention of dental caries and gingival diseases in children in community within the existing health infrastructure" was undertaken in order to test this hypothesis and also to study the logistics for implementing such a preventive programme. The health personnel who participated in this study, were given the required knowledge and skills for educating the population in the study area regarding oral hygiene, the correct usage of toothbrush and other dental cleaning devices including *datun*, the protective role of topical fluoride, and regarding harmful habits like excessive eating of sweets. Two year intervention through health education has shown a change for the better in the KAP of the population. A significantly higher proportion of the population was found using toothbrush or *datun*, and they were willingly purchasing fluoride tablets and using fluoride mouth rinse. An appreciable reduction in the incidence of caries and DMFT in children was also observed. This study has demonstrated that it is possible to educate the population for better self oral health care and that the existing health care personnel can be trained and equipped to do so effectively.

Dental varnish

Therapeutic fluoride varnish compound is used in dentistry for helping remineralisation of teeth which show early changes of caries; a state when reversal to normal state is possible. This compound owes its action to its property of sticking to the surface of the teeth even in the presence of saliva, thus prolonging the contact time. This has a prophylactic role to play in the prevention of dental caries in school children. However, as this varnish is imported, the cost of treatment is very high. The Council therefore funded a study to develop a suitable indigenous substitute for this compound. The Sriram Institute for Industrial Research, Delhi, has developed a dental varnish which compares well in its properties with the imported material. Toxicological and clinical studies on the compound have been completed, and the National Research Development Corporation (NRDC), New Delhi is arranging for the commercial exploitation of this varnish.

Stainless steel band

One of the important requirements of orthodentistry is the stainless steel band used for correcting/repositioning uneven teeth. As this material is also imported, orthodontic treatment is expensive and beyond the reach of the common man. The Council initiated a research project at the Sri Chitra Thirunal Institute of Medical Sciences and Technology, Trivandrum, to identify and develop indigenous stainless steel material for orthodontic use. The stainless steel band material developed by this Institute has undergone toxicological as also mechanical tests and has been found to be satisfactory. The cost of this material is only a fraction of that of the imported material, thus greatly reducing the overall cost of treatment and making the treatment affordable. The indigenous stainless steel band is currently undergoing clinical trials

Oral Cancer

High incidence of malignancies of the oral cavity in India has been a issue of great concern. The association of oral cavity cancer with the use of tobacco was demonstrated as early as in 1902 by Niblock[4]. The

National Cancer Registry Programme (NCRP) established by the ICMR in 1982 has also unequivocally demonstrated that while India is one of the few countries in the world with a very low overall incidence of cancer, 48 per cent of the cancers reported in the males and 20 per cent of cancers in the females are tobacco-related[5] and therefore, theoretically at least, preventable. It is possible that the widespread tobacco chewing habit is responsible for the high incidence of cancers of the oral cavity in India. The NCRP data show that oral cancer predominantly occurs in the working class almost equally among males and females who are tobacco users. Apart from the higher mortality associated with all the oral cancers, these cause much morbidity, and also interfere with nutrition. Even after treatment of such cancers there is considerable disability. Hence it is important to remember that this is one cancer which can be easily prevented, by avoiding the tobacco habit.

Submucous fibrosis

Submucous fibrosis is a disabling condition in which due to progressive fibrosis of the submucosal region of the oral cavity, the opening of the mouth get restricted gradually. In severe forms it may be impossible to open the mouth. There can be an associated burning sensation in the mouth. This disability interferes with feeding, thus adversely affecting the nutrition of the body. Submucous fibrosis is also considered as a precancerous condition, its incidence being reported to be higher in those who chew betel nut and *pan masalas*. Dentists have reported cases of submucous fibrosis in teenagers almost all of whom were habitues of *pan masala*.

The exact magnitude of the problem in India is not known, although some estimates put the prevalence in India as 0.2 - 0.5 per cent in the population[6]. There is an impression that the prevalence is higher in the south Indian population (WHO, WHD 94.5). While there is enough epidemiologicl evidence from all over the world including India[6,7] with regard to the effects of tobacco on the oral mucosa such as leukoplakia and malignancies of the oral cavity, similar information about *pan masala* is yet to be compiled. As *pan masalas* have been in the market for less than two decades, their actual impact is yet to be perceived. However, several experimental studies carried out in India have shown[8-13] unequivocally that *pan masala* is both mutagenic and carcinogenic.

Control of tobacco usage

Anti-cancer education in our country is mainly focussed on and directed towards tobacco related cancers, the main effort being to educate the people about the harmful effects of tobacco. The Council's anti-tobacco community education projects carried out at Agra, Bangalore, Goa and Trivandrum have tried different strategies to impart health education to the population on the health hazards of tobacco usage. The Trivandrum strategy included, in addition, the visual examination of the oral cavity for early diagnosis of oral lesions which provided an opportunity for treating the condition at its early stage. The results of the study show that whatever efforts were put in for community education are rewarding. A mass education programme undertaken (in different languages) all over the country through the All India Radio, under the title "Radio DATE" proved to be a successful programme demonstrating the use of this media as a feasible public education measure[14].

Sore Throat

Rheumatic fever/ Rheumatic heart disease (RF/ RHD) is an entity associated with severe morbidity and increased mortality. RF/ RHD is a condition which afflicts children and cripples them by making even normal physical activity impossible. Otitis media carries with it the threat of meningitis and its sequel of hearing impairment which is a severe disability with social consequences. Chronic suppurative otitis media is an important cause of preventable deafness in children. Sore throat marks the beginning of most of these diseases. With appropriate antibiotic therapy, it is possible to provide primary prophylaxis against these conditions. Studies carried out under the auspices of ICMR have shown that it is possible to train the peripheral health workers to identify these conditions and also ensure compliance of treatment[15,16].

Dental Problems in the Aged

Well Preserved teeth in a healthy oral cavity can last for a life time. Contrary to popular belief, old age need not be a reason for loss of teeth. Among tribal populations, one can see very old people with intact teeth. Changing life styles and food habits have resulted in periodontal diseases with consequent loss of teeth. As this becomes manifest frequently in old age, the latter is now being associated with loss of permanent teeth.

Loss of permanent teeth early in life affects the nutrition of the individual as, of necessity, the food habits of such persons have to undergo a change, so that only soft food which does not call for much mastication, are eaten. This means that conventional food items that

provide basic nutrients cannot be eaten, resulting in undernutrition or even malnutrition.

Good oral hygiene coupled with healthy food habits and periodic dental check-up can help prevent loss of teeth in early life.

Conclusion

Oral cavity is one of the most specialised as well as the most versatile organs of the body. It has several vital functions such as articulation, mastication and deglutination of food and is well provided for carrying out all these functions. Like other parts of the body, the structures in the mouth can also be affected with disease, due to infection, or poor oral hygiene or as in most cases, because of a bad habit or life style.

Oral health problems present as readily recognisible symptoms and signs such as bleeding and receding gums, painful holed teeth, sore mouth which is difficult to open,leukoplakia of the buccal mucosa and ulcers which do not heal which should prompt those afflicted to seek medical help. Early diagnosis is easy. Prompt and adequate therapy is rewarding because both the structure and function can be easily conserved.

Health education and public health measures can truly make all the difference between health and disease in the case of Oral Health, not only in the immediate future, but in later life too. For instance, in India it is feasible to give appropriate health education regarding the food habits and ill effects of consumption of excessive sugar and other refined food and these measures can be taken up energetically even at the school level. This will not only prevent the epidemic of caries and dental problems witnessed by the developed countries in the middle of the present century but also result in healthier food habits which can be of immense benefit even in case of cardiovascular diseases and cerebrovascular accidents. Good oral health is thus basic for healthy life.

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This feature which commemorates "World Health Day" (April 7, 1994) is contributed by Dr. C.R. Ramachandran, Senior Dy. Director-General, ICMR Headquarters, New Delhi.

ABSTRACTS

Some Research Projects Completed Recently

Generation of monoclonal antibodies to estrogen receptor and their application in the study of human breast cancer.

The study was carried out to isolate estrogen receptor (ER) protein from ER^+ human breast cancer cell lines (like MCF-7) and also from ER^+ human breast tumours and generate monoclonal antibodies to the purified ER protein. Immunohistochemical studies were carried out on human breast cancer tissues and fine needle aspiration biopsy (FNAB) specimens using monoclonal antibodies specific to ER. Estrogen receptor protein was isolated from MCF-7 cell lines and breast tumour tissues by pulverization of the material snap frozen in liquid nitorgen, polytron homogenization, high speed centrifugation, column chromatographic purificatin and lyophilization. The ER was characterized by Scatchard analysis and sucrose density gradient centrifugation. SDS PAGE identified the ER as a single discrete protein with a molecular weight of approximately 66-67 kDa.

Three monoclonal antibodies (MAbs) were generated by hybridization of immune spleen cells of BALB/c mice immunized with ER, with Sp2/O myeloma cells using 50 per cent PEG as fusing agent. The positive clones were screened by ELISA and selected by PAP technique using ER positive frozen breast tumour tissue sections. These MAbs, designated as ER E5,ERE10 and ERD7 were found to recognize a cytosolic ER. These MAbs were purified by ammonium sulphate precipitation and protein A sepharose chromatography. Specificity of these MAbs to ER was ascertained by dot blot analysis, western immunoblot, immunoprecipitation, radio-immuno uptake studies and immunofluorescence study.

Analysis of large number of normal breast tissues, benign and malignant breast lesions of different histological types, breast FNAB specimens and other ER^+ tissues of carcinomas of the ovaries and endometrium by ABC and PAP immunocytochemistry revealed that these ER MAbs exhibited specific staining of cytosolic ER. Most of the tumour cells were strongly positive in the case of infiltrating ductal carcinomas and mucoid adenocarcinomas. The ER values of 50 malignant breast tumour cytosols determined by DCC assay and by enzyme immunoassay (EIA) using MAb ER E5 were found to correlate. For 15 typical breast tumours with ER values in the range of 3.5-270 fmol/ mg protein, the staining patterns were proportionate to ER values. It was concluded that MAbs ER E5, ERE10 and ERD7 might serve as a valuable diagnostic tools. Besides, these may be highly useful in understanding the molecular mechanism by which estrogens stimulate cell proliferation.

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Intralenticular distribution of trace elements in normal human cataractous lenses and their role in cataractogenesis.

Intralenticular distribution of various trace elements *viz.* zinc, copper, cadmium and selenium was studied in different regions (equator, cortex and nucleus) of human normal and senile catractous lenses. Normal lenses were obtained from eye bank whereas cataractous lenses were obtained by intracapsular extraction from patients.

Concentration of all these elements were higher in various categories (immature, cortical and nuclear) of cataractous lenses compared to normal lenses. In cataractous lenses maximum concentration of these elements was found in the cortical and equitorial zones. Nucleus had least amount of these elements.

Antioxidant status of lenses with and without senile cataract was studied. Levels of glutathione-reductase, glutathione peroxidase and superoxide dismutase showed a significant decrease in cataractous lenses compared to normal lenses. Levels of ascorbic acid in aqueous humour and lenses of cataractous patients decreased significantly compared to normal eyes.

Metal binding proteins from different regions of the lens *viz.* cortex and nucleus were isolated and characterised. A 10 per cent lens homogenate labelled with ^{115m}Cd and subjected to G-75 chromatography showed two peaks corresponding to a small high molecualr weight protein and a low molecualr weight

metal binding protein. Cortical portion of lens bound more ^{115m}Cd than the nucleus. Levels of Zn and Cu which co-eluted with ^{115m}Cd were also higher in peaks from cortical regions. Molecualr weight of the metal binding protein was found to be 10,000. Ultraviolet spectra showed more absorbance at 254 nm which is characteristic of low molecualr weight metal binding protein.

Antibodies against purified lens protein from cortical and nuclear regions, cross-reacted with lens protein only and not with the low molecular weight metal binding protein from liver or kidney showing that the lens protein is an organ specific protein. Increased concentration of trace elements in the equator and cortex which are metabolically more active than the nucleus and decreased levels of metal binding proteins in this region are probably factors in the pathophysiology of cataract formation.

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Role of oxidative stress enzymes in sugar cataract and prevention by antioxidants.

The study was undertaken in Wistar strain albino rats to find out the effect of galactose feeding on activities of aldose reductase (AR), glutathione reductase (GR), glutathione peroxidase (GP), catalase and superoxide dismutase (SOD) at different stages of galactose cataract. The *in vivo* effect of vitamin C and E (antioxidants) fed individually and in combination on the enzymes and lens opacification was also studied. There was a significant alteration in the activity of all these enzymes in the lenses of galactose fed rats. The observed decrease in GP and GR could be prevented by supplementing the galactose diet with vitamin C or vitamin E.

The AR activity gradually decreased from day 2 to day 30 of feeding galactose plus vitamin C and E. The GP activity increased 3 times on day 23 as compared to day 2, whereas the GR activity increased one and a half times upto day 14 and then decreased upto day 28. Similarly there was a gradual increase in catalase and SOD activities upto day 23 on administration of vitamin C and E together with galactose.

The study revealed that the activity of defence system enzymes against oxidative stress was affected in the lenses of galactose fed rats. This effect was reversed to some extent by administering either vitamin C or vitamin E alone in the galactose diet. However, the effect of galactose feeding on lens enzyme activity was reversed more significantly by administering both vitamin C and E together with the galactose diet.

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ICMR NEWS

The following meetings of various technical groups/committees of the Council were held:

Meetings of the Scientific Advisory Committees (SACs)/Scientific Advisory Groups (SAGs) held at New Delhi:

SAC of the ICMR-NIC Centre on Biomedical Information	April 7, 1994
Mini-meeting of the SAG on Traditional Medicine Research	April 8, 1994

Meetings of the Steering Committees/Project Review Committees held:

Project Review Committee for Research in Non-Communicable Diseases	March 23, 1994 (at New Delhi)
Steering Committee of the Task Force on Venoms and Toxins	April 14-15, 1994 (at Bombay)
Project Review Committee on Pharmacology	April 15, 1994 (at Bombay)

Participation of ICMR Scientists in Scientific Events:

Dr. S.P. Tripathy, Director-General, ICMR, participated in the 20th session of the WHO South-East Asia Advisory Committee on Health Research at Yogyakarta, Indonesia (April 11-14, 1994).

Dr. C.R. Ramachandran, Senior Dy. Director-General, ICMR, and Dr. Bhanu Iyengar, Director, Institute of Pathology, New Delhi, participated in an Investigators meeting of Project 93907 on Hospital based Case Control Study of Prostate Cancer and Vasectomy at Bangkok (April 18-20, 1994).

COUNCIL'S TRAINING PROGRAMMES FOR 1994-95

Virology

At the National Institute of Virology, Pune:

... Diploma in Medical Virology (June 1994-May1995).

Reproductive Biology

At the Institute for Research in Reproduction, Bombay:

... Workshop on Gynaecologic Cytology and Immunocytochemistry (September 26-October 1, 1994).

Endocrinology

At the National Institute of Nutrition, Hyderabad:

... Annual Training Course on Endocrinological Techniques and their Applications (August 1-September 16, 1994).

Nutrition

At the National Institute of Nutrition, Hyderabad:

... M.Sc.in Applied Nutrition (June 1,1994-February 28, 1995).

... Annual Training Course in Nutrition (December 1, 1994-February 28, 1995).

Occupational Health

At the National Institute of Occupational Health, Ahmedabad:

... Orientation Course on Occupational Health for Industrial Medical Officers (September 19-24, 1994).

... Training Course on Air Pollution Monitoring and Risk Assessment (October 19-25, 1994).

... Training Course in Pesticide Residue Analysis (December 5-9, 1994).

Medical Entomology

At the Vector Control Research Centre, Pondicherry:

... M.Sc.in Medical Entomology (from August 1994: for 2 years).

... Short-term Course on Malaria, Filariasis and Urban Vector Control for in-service candidates (June 1994).

Laboratory Animal Technology

At the Laboratory Animal Information Service Centre, National Institute of Nutrition, Hyderabad:

... Training Course for Laboratory Animal Technicians (June 15-July 31, 1994).

... Training Course for Laboratory Animal Supervisors (September 12- December10, 1994).

Haematology

At the Institute of Immunohaematology, Bombay:

... Training Course in Blood Group Serology and Blood Bank Methodology for Technicians (August 9-September 8, 1994).

... Training Course in Blood Group Serology and Blood Bank Methodology for Medical Officers (August 9-October 7, 1994).

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