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Contents

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Dermatology International	2	2500	280
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Indian Journal of Biology	2	1500	170
Indian Journal of Cancer Education and Research	2	4500	500
Indian Journal of Communicable Diseases	2	1000	58
Indian Journal of Dental Education	4	3200	288
Indian Journal of Forensic Medicine and Pathology	4	12500	576
Indian Journal of Forensic Odontology	4	3200	288
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Indian Journal of Obstetrics and Gynecology	2	2000	200
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Indian Journal of Reproductive Science and Medicine	4	3000	180
Indian Journal of Scientific Computing and Engineering	2	3300	280
Indian Journal of Surgical Nursing	3	1800	70
Indian Journal of Trauma & Emergency Pediatrics	4	6500	302
International Journal of Agricultural & Forest Meteorology	2	8000	800
International Journal of Food, Nutrition & Dietetics	2	3200	900
International Journal of History	2	6000	500
International Journal of Neurology and Neurosurgery	2	7500	276
International Journal of Political Science	2	5000	400
International Journal of Practical Nursing	3	1500	70
International Physiology	2	4000	240
Journal of Animal Feed Science and Technology	2	3500	280
Journal of Cardiovascular Medicine and Surgery	2	5500	238
Journal of Orthopaedic Education	2	2500	190
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Exploring Role of Probiotics in Clinical Practice

Alka B. Patil*, Vilyesh R. Ghetia**

Abstract

The concept of probiotics , which emerged in ancient times is a rapidly advancing field. Probiotics have impact on human health. Probiotic bacteria are used to treat or prevent a broad range of human diseases , conditions and syndromes. Probiotics are effective in treatment and prevention of acute diarrhea and antibiotic induced diarrhea. Potential applications of probiotics are for treatment and prevention of relapses of crohn disease, ulcerative colitis, irritable bowel syndrome. Probiotics may be useful for prevention of respiratory infections in children, dental caries, allergic diseases. They are valuable in gynaecology in bacterial vaginosis, vulvovaginal candidiasis and urogenital infections. Areas of future interest for application of probiotics include colon and bladder cancer, diabetes and rheumatoid arthritis.

Keywords: Probiotics; Lactobacillus; Gastrointestinal infectious; Urogenital infections; Health care.

Introduction

The term probiotic was derived from the Greek word, meaning supporting life or favouring life. The concept of probiotics is very ancient. Mention of cultured dairy products is found in the Bible and the sacred scriptures of the hindus. The benefits of probiotics have been recognized and explored for over a century. The pioneer research of metchnicoff's theory of longevity was converted into commercial reality by shirota and kellog in 1930.

The aim of this article is to pay tribute to pioneers in the field and to provide recent knowledge in the field of probiotics. History of probiotics is highlighted. The article will focus on types of bacteria in probiotics and their mechanism of action. We capture the impact of probiotics in clinical practice, including gynaecology and women's health.

What are Probiotics

Soured milk and cultured dairy products such as kefir, kourniss, leben and dahi were often used therapeutically before the existence of microorganisms was recognized. The use of microorganism in food fermentation is one of the oldest methods for producing and preserving food.[1]

The rationale for using probiotics is that the body contains a miniature ecology of a number of bacteria known as natural flora. The flora can be thrown out of balance by a wide range of circumstances including the use of antibiotics or other drugs, excess alcohol, stress, disease, exposure to toxic substances, and even the use of antibacterial soap. In these circumstances, symbiotic bacteria decrease in number and allow to thrive pathogenic organisms which are detrimental to health. Probiotics are defined as live microorganisms which when administered in adequate

Author's affiliation: Professor & HOD Obst & Gynaecology, **Resident, Dept. of Obst & Gynaec, A.C.P.M. Medical College, Dhule-424001, Maharashtra, India.

Corresponding Author: Dr. (Mrs.) Alka B. Patil, Sadguru Colony ,19/20, Near Datta Mandir Chawk, Deopur, Dhule-424005, Maharashtra, India.

E-mail: alkabpatil@rediffmail.com

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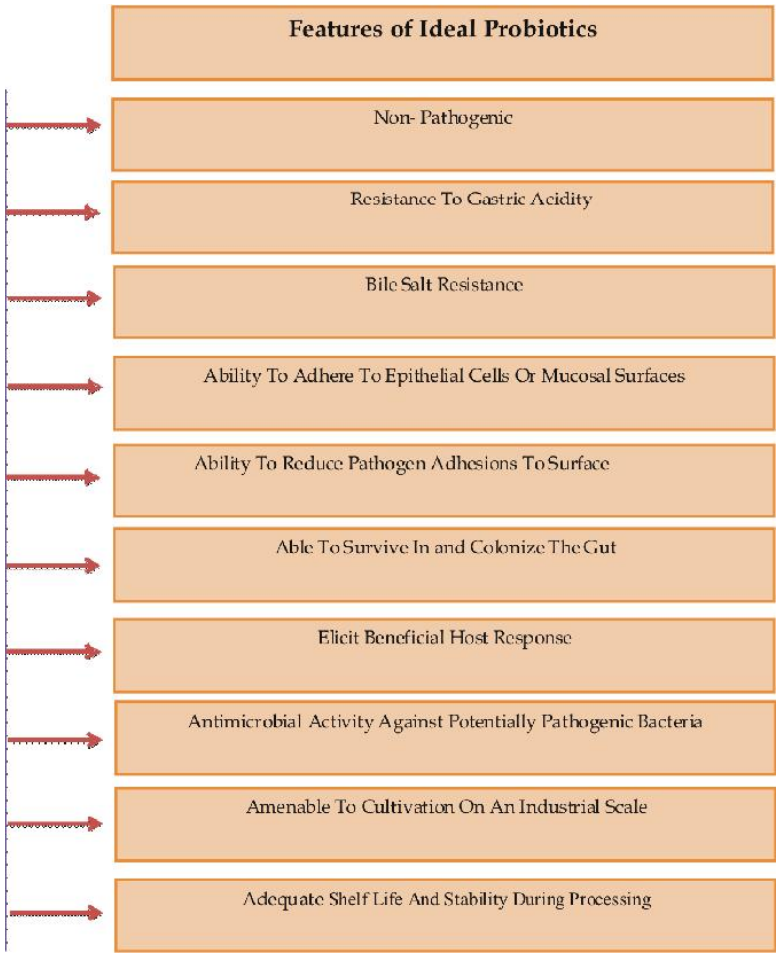
Figure 1



amounts, confer a beneficial health effect on the host.[1]

The probiotics that are marketed as nutritional supplements and used in foods, such as yogurt, are principally the bifidobacteria species and the lactobacillus species. The effectiveness of probiotics is related to their ability to survive in the acidic environment of the stomach and the alkaline conditions in the duodenum, as well as their ability to adhere to the intestinal mucosa of the colon and to colonize the colon.[1]

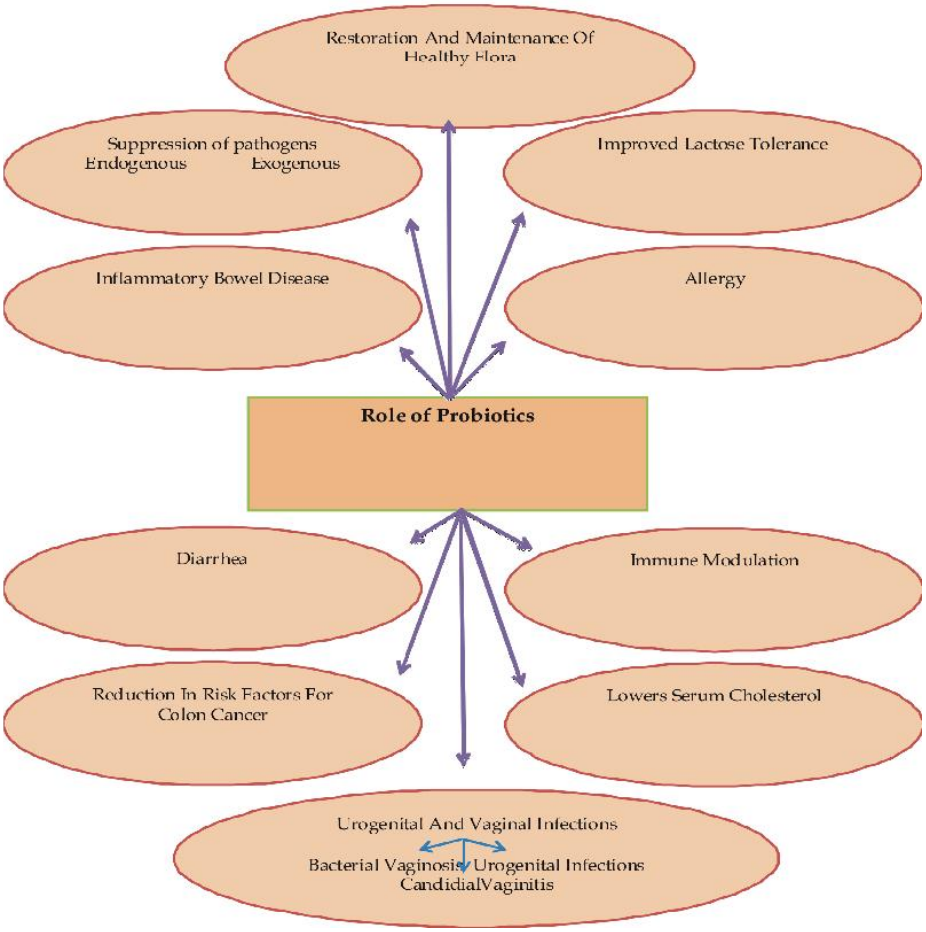
Probiotics help to provide optimum balance in the intestines. Probiotics species competitively block toxic substances and growth of unwanted bacteria and yeast species while they compete for the space. The microrganisms need to be alive when they are consumed and therefore maintaining suitable conditions for their storage and transport before consumption is important. Probiotics may have antimicrobial, immunomodulatory, [1] anticarcinogenic, antiallergeic, antidiarrheal and antioxidant properties. The various mechanisms include chelation of metallic ions, scavenging of reactive oxygen species, and reduction of bacterial activity.[1]

Some of the characteristics are considered essential for a probiotic to have therapeutic effects. These are:

1) gastric acid and bile salt stability;
2) an ability to adhere to the intestinal mucosa; and
3) an ability to colonise the intestinal tract (at least temporarily).

Before prescribing any probiotic supplement or food, it is imperative to ensure that the bacterial strains contained in the product have these three vital qualities. If not, it is wise to

Figure 2:Role of Probiotics



prescribe one that does. Other vital characteristics include the ability to produce antimicrobial compounds and to directly antagonise more pathogenic organisms. Additionally, the anti-microbial compounds produced should have selective activity, so that they inhibit the growth of pathogenic bacteria, but not beneficial species.[2]

Types of Bacteria in Probiotics

Lactobacillus acidophilus NCFM produces antimicrobial substances that inhibit the growth of some beneficial species of bacteria, including L. fermentum, L. delbrueckii ssp. lactis, and L. delbrueckii ssp. bulgaricus, whilst having no effect on pathogens. Whereas L. rhamnosus GG and L. johnsonii La1 produce compounds that only inhibit the growth of potentially pathogenic bacteria, not beneficial ones. Another important probiotic characteristic, is the ability of the strain to beneficially alter the composition of the GIT flora when consumed — both reducing numbers of potentially pathogenic organisms and increasing numbers of beneficial organisms.[2]

Clinical Utility of Probiotics

Uses in Gastrointestinal Diseases

Neonates

Intestinal infections in newborn children are common, and in developing countries diarrhea is a prime cause of morbidity and mortality. Necrotizing enterocolitis is one devastating intestinal disorder that a preterm infant may face within a neonatal intensive care unit. If non pathogens, such as lactobacilli and bifidobacteria, colonize the intestine, or if breast milk rather than formula is used, the incidence of necrotizing enterocolitis has been reported to fall.[3]

The immune response within the gastrointestinal tract is a fine balance between the release of proinflammatory (e.g., interleukin-1, -6, and -8 and tumor necrosis factor) and anti-inflammatory (e.g., interleukin-1RA, -4, and -10) cytokines. In a review on mucosal immunity starting at birth, Walker reported a correlation between a normal gut microbiota and protection against various infections. This is an important observation because it supports the concept of early intestinal colonization with organisms such as lactobacilli and bifidobacteria and possibly subsequent protection from necrotizing enterocolitis and other diseases.[3]

At the least, probiotics provide a safe and potentially beneficial remedy, especially when delivered in milk, which provides the child with nutrition and a means to overcome adverse effects of fluid loss.The strongest evidence of a beneficial effect of probiotics has been established with *L. rhamnosus* GG and *B. lactis* BB-12 for prevention and *L. reuteri* SD2222 for treatment. There is sufficient evidence to recommend use of at least one probiotic strain, *L. rhamnosus* GG, in capsule or milk form, to treat acute diarrhea in children, in combination with standard oral rehydration.[3]

Irritable Bowel Syndrome

Probiotic use in patients suffering from inflammatory bowel disease (IBD) is now quite common, with numerous published clinical trials. Studies have shown that probiotic intervention has helped to decrease immunological disturbances, modify disease activity, and assist in the normalization of increased intestinal permeability.[4]

Treatment and Prevention of Relapses of Inflammatory Bowel Disease.

One of the major potential applications of probiotics is for the treatment and prevention of relapses of Crohn disease, ulcerative colitis, and irritable bowel syndrome.

There have been reports of beneficial effects for inflammatory bowel disease that resulted from the administration of Lactobacillus salivarius, Escherichia coli strain Nissle, S. boulardii ,and VSL#3 (VSL pharmaceuticals).[5]

Lactose Malabsorption

A large number of people, as they age, experience a decline in the level of lactase (Beta galactosidase) in the intestinal brush border mucosa. Resulting in flatus, bloating, abdominal cramps, and moderate-to-severe (watery) diarrhea. During the fermentative process involved in the production of yogurt, lactase is produced, which can exert its influence in the intestinal tract. The delivery of lactase to the intestine via the consumption of lactase-producing probiotics is a practical approach for treatment of lactose malabsorption.[5]

An Emerging Trend of High-Dose Probiotic Use in Clinical Practice

The use of probiotics as bio-therapeutic agents is common place. These probiotics are typically delivered in relatively low-dose functional foods (primarily yogurts) providing up to a few billion colony forming units (CFU); or in modest doses, in the form of dietary supplements of 5-25 billion CFU. Over the past several years, a trend has emerged in which much higher doses of probiotics are being used in both clinical practice and research.[4]

Not surprisingly, the initial focus of the clinical research on high-dose probiotics has been on functional GI disorders such as inflammatory bowel disease (IBD), irritable bowel syndrome (IBS), and antibiotic-associated diarrhea (AAD). These conditions represent extreme examples of dysbiosis and dysfunction within the mucosal immune system of the gut; a system which is integrally associated with the microflora of the gut lumen. Although supplemental probiotics are only temporary members of the intestinal microbiota (perhaps 1-2 weeks), the introduction of large quantities of probiotics

may sufficiently alter this environment allowing the probiotic to act as a potent bio-therapeutic agents in a manner that a lower dose would not.[4]

Antibiotic Induced Diarrhoea

It is well known that antibiotic therapy can severely disrupt the gut microbial ecology. Taking a probiotic during antibiotic therapy can often help preserve beneficial flora and improve stool consistency and frequency.[4]

The Role of Probiotics in Allergic Disorders

The interest in probiotic therapeutic potential in allergic disorders stemmed from the fact that they have been shown to reduce inflammatory cytokines and improve intestinal permeability in vitro. Such effects would be desirable in treating allergic disorders. Therefore, several studies have been designed to examine the efficacy of probiotics in many allergic conditions, such as eczema, allergic rhinitis, asthma, food allergies and in children with atopic conditions such as atopic dermatitis.[6]

Probiotics in Oral Health

Probiotics Impact on Oral Health Issues

Oral administration of probiotics has a direct impact on dental caries. Lactobacillus rhamnosus and lactobacillus casei have proved their potential to hamper growth of oral streptococci, chronic periodontitis can also benefit from probiotics. Antagonistic interactions can regulate periodontal pathogens. Krasse have reported that application of L. reuteri can decrease gum bleeding and gingivitis. Candida albicans ,yeast is among the most common infectious agents in the mouth, especially amongst the elder and patients with compromised immunity. Elahi *et al*, showed that application of L. acidophilus and L. fermentum resulted in decline of C. albicans in mice. Natakka *et al*, registered a reduction in C. albicans after administering probiotics chesse containing L. rhamnous to the elderly. Classical probiotic strains include lactobacillus and bifidobacterium species which have positive probiotic impact on the oral cavity. Genetically modified probiotic strains involve the administration of live microorganisms with their genes modified.[7]

Probiotics in Cancer

The ability of lactobacilli and bifidobacteria to modify the gut microbiota and reduce the risk of cancer is in part due to their ability to decrease β-glucuronidase and carcinogen levels. Cancer recurrences at other sites, such as the urinary bladder, also appear to be reduced by intestinal instillation of probiotics, including *L. casei* shirota (the strain present in Yakult, a Japanese milk-based drink taken by an estimated 26 million people every day).[3]

Role of Probiotics in Gynaecology

Bacterial Vaginosis

Many women with BV are asymptomatic yet are at risk of more serious complications such as endometriosis, pelvic inflammatory disease and complications of pregnancy including preterm labour. Oral and vaginal administration of lactobacilli can eradicate asymptomatic and symptomatic Bacterial Vaginosis. Oral administration of Lactobacillus acidophilus and yogurt has been used in the prevention and therapy of candidal vaginitis, although no efficacy data have yet been generated. The necessity for the lactobacilli to produce hydrogen peroxide has been proposed, but given that these microorganisms are more prone to being killed by spermicides, the combination of 2 or more strains, one of which produces hydrogen peroxide and others which resists spermicidal killing, may prove to be more therapeutic. Probiotic may be important for reducing the preterm birth rate in pregnant women. Probiotics can safely used before pregnancy or in the first trimester. It may be used as in adjunctive to therapy in the second trimester avoiding potential side effects. The optimal treatment and prophylaxis against BV should preferably be natural, non-

toxic for humans or healthy vaginal microflora, biodegradable and cost effective. [8]

Vulvovaginal Candidiasis

The vaginal microbiota is one of the first lines of defense against vulvovaginal candidiasis (VVC). The low p^H is considered a result of microbial metabolic products (mostly lactic acid) of glycogen, which is produced by vaginal epithelial cells. During menses, the composition of the vaginal microbiota is destabilized and it is at that time that probiotic lactobacilli may have a role to play in maintenance of the barrier to C. albicans infection.[9]

The recurrent use of antifungal agents for vulvovaginal candidiasis is a matter of concern for the proliferation of drug-resistant strains of yeast. Probiotic treatments may be an alternative or adjunct to antimicrobial drug use. The pH of the media was decreased in the presence of the lactobacilli, which is also known to be inhibitory to C. albicans.[9]

VVC symptoms emerge during times of increased estrogen levels in the vaginal tract and suggests a mechanism by which some probiotic lactobacilli can be protective against VVC. From a regulatory science viewpoint, we suggest that future probiotic bacterial strains be selected for their ability to limit 17β-estradiol-induced growth and hyphal germination by C. albicans.[9]

HIV

Among people living with HIV, the gut is one of the most severly affected sites. 80% of entire cell population resides in the gut, the gut of HIV patients is the centre of many problem. Their intestinal barrier is severly damaged, causing influx of bacterial products into blood stream, poor uptake of nutrients and chronic diarrhea. This results in systemic inflammation, HIV replication and faster progression towards AIDS whether modifying the intestinal microflora may result in reduced immune activation and increased CD4 count is a link that warrants further investigations.

The supplementation of lactobaccilus in a food based product or a capsule provides a potential way to improve the vaginal flora. Lactobacillus strains have been shown in vitro to directly inhibit the growth of various vaginal pathogens such as Gardnella vaginallis, Neisseria gonorrhea and HIV. They also compete for adhesion sites, stimulate the local antimicrobial immune response and lower the p^H.[10]

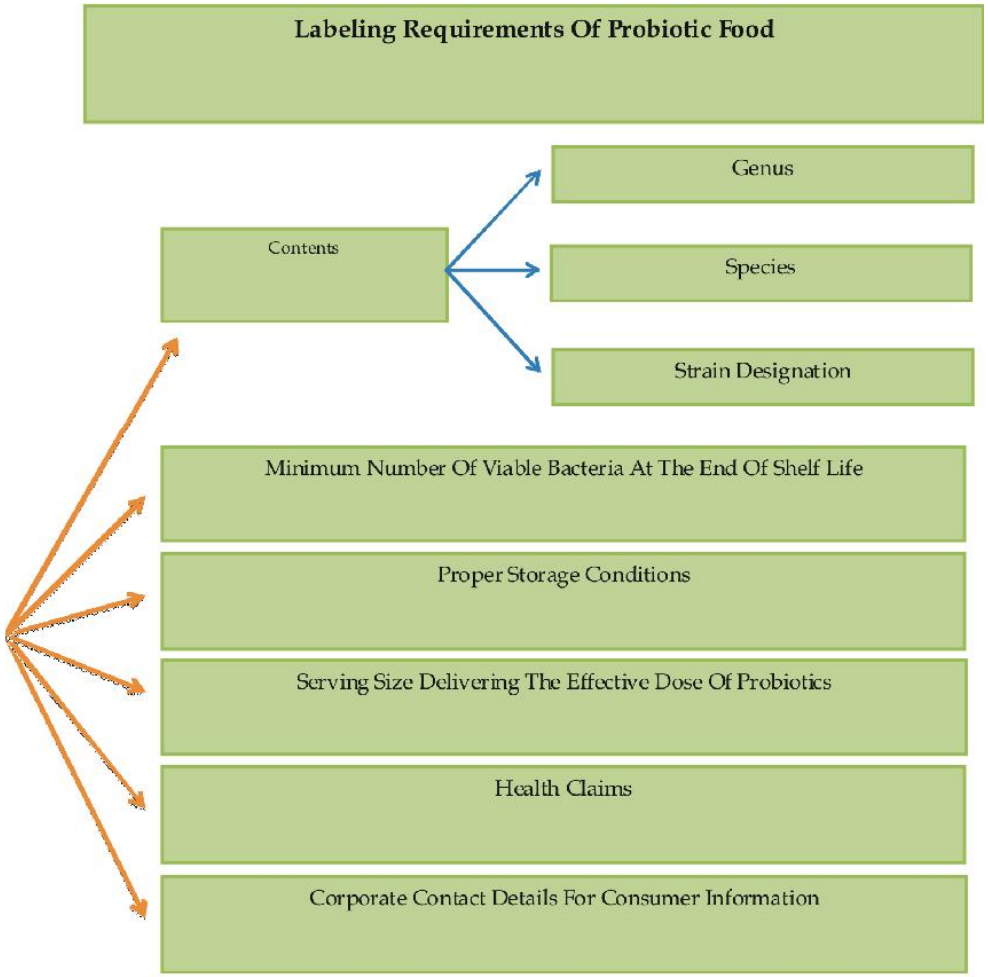
Urogenital Infections

The use of probiotics, especially lactobacilli, has been considered for the prevention of UTIs. Since lactobacilli dominate the urogenital flora of healthy premenopausal women, it has been suggested that restoration of the urogenital flora, which is dominated by uropathogens, with lactobacilli may protect against UTIs.[11]

Many clinical trials in women with UTIs have been carried out to assess the effectiveness and safety of probiotics for prophylaxis against uropathogens. Most of them had encouraging findings for some specific strains of lactobacilli. Lactobacillus rhamnosus GR-1 and L. reuteri RC-14 (previously called L. fermentum RC-14) seemed to be the most effective among the studied lactobacilli for the prevention of UTIs. The evidence from the available studies suggests that probiotics can be beneficial for preventing recurrent UTIs in women; they also have a good safety profile.[11]

Antimicrobial treatment of urogenital infections are not always effective and problems arise due to bacterial infections, yeast resistance and recurrent infections as well as side effects related to their use. Alternative remedies are of interest to patients as well as doctors. Recurrences are due to antimicrobials failing to eradicate pathogens, perhaps due to resistance or the virulent organisms reinhabit the vagina from the gut or the partner. Recurrent infection may also be due to the elimination of the most common organisms in the vagina by antimicrobial therapy, increasing susceptibility to

Figure 3



recolonization by pathogens.[10]

CIN

The relationship between BV and cervical dysplasia and Ca is not consistent. The possible role of B.V. in the etiology of CIN is the failure to control STI particularly oncogenic HPV. It has been suggested that BV with anaerobes are capable of producing carcinogenic substances called nitrosamines.

Food Rich in Probiotics

With the increasing evidence that some bacteria can be beneficial to human health and metabolism, the interest in foods containing live bacteria has increased and today food manufactures are adding beneficial bacteria to a wide variety of foods and beverages.[12]

No. of carriers for probiotics have been examined recently including mayonnaise, edible spreads and meat in addition to other products of dairy origin; Probiotic organisms are available commercially in milk, sour milk, fruit juices, ice-cream ,oat based products. One of the earliest probiotic effects to be exploited for human benefit is the production of lactic acid as a normal end product of fermentation by various lactic acid bacteria including Lactobacillus.The antimicrobial action of lactic acid has long been used for food preservation.[10]

Preparations of Probiotics

Typical doses of probiotics range from one to ten billion colony forming units (CFU), to be taken a few times a week, to maintain their effect on the microecology. The microrganisms

need to be alive when they are consumed and therefore maintaining suitable conditions for their storage and transport before consumption is important.[1] Insertion of lactobacilli into the vagina via a pessary or capsule is an effective means of boosting content of the flora and overcoming some pathogens or reducing their ability to dominate. This seems to be true for treatment of BV and possibly UTI pathogens. The dried lactobacilli used in vaginal suppositories appear to be capable of hydrating from the capsule and interfering with pathogenic organisms. Oral dosage seems to require around 10^9 viable bacteria once or twice weekly, although a once-per-day vaginal protocol for 3 days might initially be required to displace large pathogen biofilms in the urogenital tract.[13] Natural antimicrobials from Lactobacillus spp. can be further optimized using the multiple hurdle approach. Hurdle technology is the combination of different stress factors such as chemical or biological preservatives, low pH, temperature, oxidative compounds and competitive microorganisms to achieve a synergistic or additive effects to control pathogenic bacteria.[13]

Labelling of Probiotics

It is essential to label the probiotic product precisely. The market labels should contain the name of the used strain, the number of viable bacteria and indications for treatment. Sufficient number of probiotic cells must survive through the shelf life of product.

Side Effects

Possible Negative Effects of Probiotics

Annually over one billion doses of probiotics are administered worldwide, those administered for urogenital health are well tolerated. More clinical trials are to be conducted for confirmation of its safe therapeutic use. Probiotics should not be used as replacement option. In normal healthy persons, probiotics when taken in recommended doses does not cause any significant side effects. In case of people having an underlying disease or a compromised immune system, probiotics can cause potential health problems. Probiotics may disturb the normal metabolic processes and autoimmune responses of the body. According to medical studies conducted, there is a possibility that probiotics may interact with immunosuppressive drugs, leading to life threatening conditions. Hence those who are on immunosuppressive medications should strictly avoid probiotics. Effects of particular probiotic vary from those of another. Hence, while opting for a probiotic, it is important to select the specific probiotic strain.[8]

Discussion

As health care providers, we are striving for disease prevention and probiotics lead us to believe, they will aid in this medical effort. *Probiotics are not magic bullets* but evidence is accumulating that the use of probiotic strains will help restore and maintain urogenital and intestinal health. Intake of scientifically selected probiotics would provide natural, safe, and effective means of regulating the fluctuating vaginal flora and thereby lower the risk of infection in healthy and sick women. Probiotics are important tools in the therapeutic procedure and essential component supporting the pharmacological treatment, especially along with rapid increase of antibiotic treatment of bacteria. It is essential to know the potential side effects such as systemic infections, overstimulation of immunological systems or gene transfer.

The non-pathogenic organisms used as probiotics consist of a wide variety of species and subspecies, and the ability to adhere, colonize and modulate the human gastrointestinal system is not a universal property. Lactobacillus and Bifidobacterium are the main probiotic groups. Health effects imparted by probiotic bacteria are very strain specific, therefore there is no universal strain that would provide all proposed benefits, not even strains of the same species. It is critically

important that strains are characterized and tested clinically using delivery system of choice.

The viability of probiotics is a key parameter for developing probiotic food products. New technologies have been developed to enable high cell yield at large scale and ensure probiotic stability for a long period in food. Various food matrices , dairy and non-dairy, have been used with probiotics with different technologies, such as microencapsulation, cell immobilization and continuous fermentation. The probiotics will become an important and viable ingradients in functional foods, expanding the probiotic application outside the pharmaceutical and supplement industries.

More efficient technologies could lead to greater product efficacy and strain diversification. Some authors have presented developments in fermentation technologies for producing probiotic bacteria as well potential new approaches for enhancing the performance of these organisms during fermentation, downstream processing, and utilization in commercial products, and for improving functionality in the gut.

Human testing will be vital not only to fulfil the requirements for strain to be called probiotic, but to increase our understanding of how products work. Applications in the field of cancer, cardiovascular disease, inflammation, allergy and infection are currently the main target areas with potential to benefit large numbers of people.

Future applications include the treatment of rheumatoid arthritis, treatment of irritable bowel syndrome, cancer prevention, prevention of ethanol-induced liver disease, treatment of diabetes, and prevention or treatment of graft versus-host disease. The use of probiotics in medical practice is rapidly increasing, as are studies that demonstrate the efficacy of probiotics. Overall, probiotics appear to be here to stay as part of the physician's armamentarium for the prevention and treatment of disease.

The emergence of new molecular, microscopic, nanoscale and imaging technologies will make it feasible to see in real time how probiotic (and indeed indigenous) bacteria influence the host. This will keep human regain their health when adversely affected by pathogenic microbial damage, antimicrobial treatments and other threats. Probiotics is the concept where science and commerce need to meet.

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Effect of Nutritional Counselling on Risk Level of Dyslipidemia in Type 2 Diabetics

Bharti Jain

Abstract

The study entitled Effect of Nutritional Counselling on Risk Level of Dyslipidemia in Type 2 Diabetics was carried out at Sardar Patel Medical College and Hospital, Bikaner city. For the purpose, 180 type II diabetics, belonging to the middle income group were selected. The selection of the subjects was done on the basis of the duration of the disease : diabetics suffering from, last 5 years (stratum I) and last 10 years (stratum II). Further each strata was divided on the basis of BMI into obese, normal weight and underweight group with equal number of males and females in each group. General information like subjects' age, sex, income, educational status, occupational status, food habits and type of life style were studied. Past history of the subjects in relation to diabetes like age at onset of disease, duration of disease, history of disease in the family, associated diseases and symptoms occurring on hyperglycemia were also studied. The lipid profile of the subjects was assessed in relation to total cholesterol, triglyceride and HDL cholesterol. Data on lipid profile was collected twice, first record was taken at starting of the study (prior to counselling) and the second after 3 months of nutrition counselling. Maximum per cent of subjects (55.55%) were falling in the age group of 45-55 years at the time of study. The mean age at the onset of diabetes was 47 years. Thus, maximum number of subjects suffered from diabetes above 40 years of age. Data regarding serum cholesterol and serum triglycerides stated that prior to counselling subjects were at 'high' and 'high moderate risk' of dyslipidemia, respectively. Further, subjects of stratum II were noted for significantly ($P<0.01$) higher levels of serum cholesterol and triglycerides prior to counselling. But impact of counselling was clearly noted by the significant ($P<0.005$) decrease in the levels, with majority of the subjects noted for 'low risk' of hyperlipidemia for both serum cholesterol and triglycerides level. The difference in between the two strata was non significant after the counselling. A non significant difference in HDL-C level of the subjects was noted within and in between the two strata with 'moderate risk' of hyperlipidemia noted at both prior and after the counselling.

Keywords: Non insulin independent diabetes mellitus; Dyslipidemia; Total cholesterol; Triglyceride level; High density lipo protein; Nutrition counselling.

Introduction

Diabetes mellitus (DM) is one of the leading health problems and contributing significantly to morbidity and mortality and adversely affecting both the quality and length of life.Diabetes is a disease that should be prevented and/or controlled, as it cannot be cured completely. The approach for the treatment of diabetes has been radically changed in the recent decades. Due to advanced technologies, diabetes is now one step closer to control by means of diet management, insulin/hypoglycemic drugs and exercise along with other life style changes.[1] In the past 30 years, the prevalence of Diabetes Type 2 has skyrocketed to such an extent that it is now viewed as an epidemic in the western world. From being a once fairly mild and rare ailment of the elderly to becoming a chronic disease, diabetes mellitus affects people of every age, race, and background, and is now a major modern cause of premature death in many countries

Author's affiliation: *Associate Professor, Department of Food Science and Nutrition, Maharshi Dayanand Saraswati University, Ajmer - 305001, Rajasthan, India.

Corresponding Author: Dr. Bharti Jain, M.Sc. Hons., Ph.D, Associate Professor, R/o: 8, "VARDHMAN", Suraj Vihar Colony, Lohagal Road, Ajmer-35001, Rajasthan, India.

E-mail: drbhartijain27@rediffmail.com

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around the world,

In fact, the success of treatment of diabetes mellitus largely depends upon effective motivation of the patients, for which education is the best way. Education has now become an integral part of managing diabetes and has proved to improve the various outcomes. Proper nutrition education and individual counselling help the patients to understand the disease and follow the therapy effectively. This in turn reduces the risk of complications to a greater extent and improves the quality of life.[2]

The role of diet management in diabetes has now been well recognized all over the world. Diet and exercise are so powerful tools that they free many of the patients from medications and insulin doses. Several long term studies have unequivocally proved the prime importance of calorie restricted well balanced diet in the treatment of disease. The diabetic diet is not complete deviation from the normal diet rather the vital aspect is routine of meals and quantity of food consumed.

Thus, to equip the patients with skill, knowledge and attitudes, to enable them to solve their health problems and better living with diabetes, the present investigation "Effect of Nutritional Counselling on risk level of Dyslipidemia in Type 2 Diabetics",was framed with the objective to find out the risk level of dyslipidemia in type II diabetics and to correlate the effect of nutrition counselling and risk level of dyslipidemia with the duration of disease and body mass index of the diabetics.

Material and Methods

Methodological aspects related to present study have been described in following phases:

Phase I: Selection of the Samples

Bikaner is one of the 7 divisions of Rajasthan having 5 sub-divisions. Bikaner division was chosen as the area for study. Further, those subjects were chosen who were residing in urban area of the Bikaner city. Purposive sampling method was undertaken to select the patients. Diabetic patients who were registered at Govt. Sardar Patel Medical College and hospital, Bikaner as outdoor patients were taken under the study group. The study was conducted on 180 middle aged diabetics. All subjects belonging to the middle income group were taken for the study.

Only those subjects were chosen for the study who were suffering from type II diabetes mellitus i.e. non insulin dependant diabetes mellitus and were only on oral hypoglycemic drugs for the treatment of the disease and not on insulin. Availability and willingness of the subjects to cooperate and participate during the course of the study were considered while selecting and recording the various information required.

The collection of sample was based on the duration of disease. The total sample was divided into 2 strata. Stratum I included diabetics suffering from last 5 years and stratum II included diabetics suffering from last 10 years. Further each strata was divided on the basis of BMI (Body Mass Index) into 3 categories i.e. Obese, normal weight and underweight. Further equal number of males and females were studied under each category.

General information like subjects' age, sex, income, educational status, occupational status, food habits and type of life style were studied. Past history of the subjects in relation to diabetes like age at onset of disease, duration of disease, history of disease in the family, associated diseases and symptoms occurring on hyperglycemia were also studied for effective counselling of the diabetics.

Phase II: Assessment of Risk Level of Dyslipidemia Prior and after Nutritional Counselling

Body fat pattern has been reported to be strongly associated with lipid concentration. The lipid profile of the subjects was assessed to find out the risk level of dyslipidemia. The most common pattern of dyslipidemia in type 2 diabetic patients is elevated total cholesterol,

triglyceride and decreased HDL cholesterol levels. Venous blood samples were collected from all the subjects after at least 8 hrs fasting. The sera were analysed for total cholesterol, triglycerides (TG) and high-density lipoprotein cholesterol (HDL). The blood samples were collected using anticoagulants. The serum total cholesterol was determined by enzymatic ERBA Test. The serum triglycerides was estimated by semi auto analyzer using enzymatic kits as described by Jacobs and Denmark.[3] The HDL cholesterol is estimated using ERBA cholesterol reagent as described by Miller.[4] The level of lipid proflile given by WHO was used to find out the risk level of dyslipidemia.[5]

Data on lipid profile was collected twice, first record was taken at starting of the study (prior to nutrition counselling) and the second after 3 months of nutrition counselling. Extreme efforts were done to train the patients to understand the disease and to help themselves to cope up with everyday demands of diabetes and to regulate it. For the purpose, a booklet was also prepared with the title "madhumeh ke sath jiye masti se". Complete information regarding etiology of diabetes and management of the disease was discussed in detail in the booklet. The booklet was prepared after thorough study of books, discussion with experts and on the basis of work experience in hospitals. Main three principles of management of diabetes were considered namely diet, drug and exercise in the detailed in booklet. Acute and chronic complication of diabetes were explained with the help of coloured photos so that subjects can be aware of the severity of the disease if not handled carefully. Exercise part was explained to the subject so that they can do these exercises by their own at home.

Next, the individual counselling method was opted to educate about the disease, for each of the patient. Education and counselling were imparted in a friendly environment. The education programme was rigorously evaluated to determine their outcomes, cost effectiveness and to optimize the method of counselling. No education programme can be said completed without evaluation of outcomes and desirable changes. Some possible biochemical measurements related to lipid profile, which are simple and easy to perform and at the same time giving the maximum information on risk level of dyslipidemia, were chosen for the present study.

Results and Discussion

The results of the present investigation are discussed as follows:

Bikaner is one of the 32 districts of Rajasthan (India) and occupies about 8 per cent area of the state. The number of diabetics in Bikaner city is increasing with a rapid rate for which heredity, ignorance and lack of knowledge are the main causative factors. Diet, drugs/insulin and exercise are the three main horses on which management of diabetes runs. Slight modification of diet according to the disease not only helps the patients to control diabetes but also fulfills the daily need of nutrients for the body. Along with the balanced diet, natural hypoglycemic foods also prove very beneficial in curing dyslipidemia and also have no side effects as compared to drugs. The most common pattern of dyslipidemia in type 2 diabetic patients is elevated cholesterol levels, triglyceride levels and decreased HDL cholesterol levels. Impaired lipid metabolism resulting from uncontrolled hyperglycaemia has been implicated in cardiovascular complications in diabetes patients. The aim of this study was to examine the impact of glycaemic control on the lipid profile of diabetic patients.

The mean age at the onset of diabetes was 47.0 years and 46.2 years for the subjects of stratum I and stratum II, respectively (Table 1). Comparing the data according to the sex, the results revealed that incidence of diabetes was slightly earlier in females as compared to males, although the difference was not significant. This may be due to the fact that menopause also occurs in between the age of

Table 1: Mean Age (in Years) of Diagnosis of the Diabetics

BMI	Obese		Normal weight		Underweight		Total		Overall
	M	F	M	F	M	F	M	F	
Stratum I									
Age (yrs)	47.2	45.4	48.2	48.3	47.5	45.7	47.6	46.4	47.0
± S.E.	± 2.26	± 1.95	± 1.72	± 1.87	± 1.71	± 1.71	± 1.13	± 1.06	± 0.77
Stratum II									
Age(yrs)	46.7	44.5	47.5	49.4	45.5	43.7	46.5	45.8	46.2
± S.E.	± 1.96	± 1.78	± 1.87	± 1.73	± 1.71	± 1.78	± 1.07	± 0.99	± 0.73
F Value	0.24	0.534	1.042	0.981	2.10	0.699	1.67	2.08	0.194

Table 2: Per Cent Distribution of the Diabetics According to the Risk Level of Cholesterol Dyslipidemia, Prior and after Counseling (Stratum I)

Cholesterol (mg/dl)	Risk	Obese		Normal weight		Under weight		Total		Overall
		M	F	M	F	M	F	M	F	
<200										
Prior Couns.	Low	13.33 (2)	--	13.33 (2)	26.67 (4)	40.00 (6)	46.67 (7)	22.22 (10)	24.44 (11)	23.33 (21)
After Couns.		40.00 (6)	53.33 (8)	46.67 (7)	46.67 (7)	66.67 (10)	60.00 (9)	51.11 (23)	53.33 (24)	52.22 (47)
201-239										
Prior Couns.	Moderate	6.67 (1)	13.33 (2)	33.33 (5)	6.67 (1)	33.33 (5)	33.33 (5)	24.45 (11)	17.78 (8)	21.11 (19)
After Couns.		33.33 (5)	33.33 (5)	46.67 (7)	13.33 (2)	33.33 (5)	40.00 (6)	37.78 (17)	28.89 (13)	33.33 (30)
> 240										
Prior Couns.	High	80.00 (12)	86.67 (13)	53.34 (8)	66.66 (10)	26.67 (4)	20.00 (3)	53.33 (24)	57.78 (26)	55.55 (50)
After Couns.		26.67 (4)	13.34 (2)	6.66 (1)	40.00 (6)	--	--	11.11 (5)	17.78 (8)	14.45 (13)

Figures in parenthesis denote no. of subjects Counselling wise $\chi^2_2 = 34.12^{***}$ (P<0.001)

Table 3: Percent Distribution of the Diabetics According to the Risk Level of Cholesterol Dyslipidemia, Prior and after Counseling (Stratum II)

Cholesterol (mg/dl)	Risk	Obese		Normal weight		Under weight		Total		Overall
		M	F	M	F	M	F	M	F	
<200										
Prior Couns.	Low	6.67 (1)	--	20.0 (3)	13.33 (2)	46.66 (7)	--	24.44 (11)	4.44 (2)	14.44 (13)
After Couns.		53.33 (8)	13.33 (2)	53.33 (8)	53.33 (8)	60.00 (9)	66.67 (10)	55.56 (25)	44.44 (20)	50.00 (45)
201-239										
Prior Couns.	Moderate	-- (--)	--	6.67 (1)	13.33 (2)	26.67 (4)	80.00 (12)	11.11 (5)	31.11 (14)	21.11 (19)
After Couns.		40.00 (6)	86.67 (13)	33.33 (5)	26.67 (4)	26.67 (4)	33.33 (5)	33.33 (15)	48.89 (22)	41.11 (37)
> 240										
Prior Couns.	High	93.33 (14)	10.00 (15)	73.33 (11)	73.34 (11)	26.67 (4)	20.00 (3)	64.45 (29)	64.45 (29)	64.45 (58)
After Couns.		6.67(1)	--	13.34 (2)	20.00 (3)	13.33 (2)	-- (--)	11.11 (5)	6.67 (3)	8.89 (8)

Figures in parenthesis denote no. of subjects Counselling wise $\chi^2_2 = 61.28^{***}$ (P<0.001)

Table 4: Percent Distribution of the Diabetics According to the Risk Level of Triglycerides Dyslipidemia, Prior and after Counseling (Stratum I)

Triglycerides (mg/dl)	Risk	Obese		Normal weight		Under weight		Total		Overall
		M	F	M	F	M	F	M	F	
<120		6.67	13.33	33.33	6.67	46.67	60.00	28.89	26.67	27.78
Prior Couns.	Low	(1)	(2)	(5)	(1)	(7)	(9)	(13)	(12)	(25)
After Couns.		53.33	60.00	60.00	80.00	66.67	86.67	60.00	75.56	67.77
		(8)	(9)	(9)	(12)	(10)	(13)	(27)	(34)	(61)
121-160		33.33	26.67	26.67	60.00	26.67	26.67	28.89	37.78	33.33
Prior Couns.	Moderate	(5)	(4)	(4)	(9)	(4)	(4)	(13)	(17)	(30)
After Couns.		46.67	40.00	40.00	20.00	33.33	13.33	40.00	24.44	32.23
		(7)	(6)	(6)	(3)	(5)	(2)	(18)	(11)	(29)
161-200		53.33	46.67	33.33	26.66	26.66	13.33	37.78	28.88	33.33
Prior Couns.	High	(8)	(7)	(5)	(4)	(4)	(2)	(17)	(13)	(30)
After Couns.	Moderate	--	–	–	--	--	--	–	--	–
> 200		6.67	13.33	6.67	6.67			4.44	6.67	
Prior Couns.	High	(1)	(2)	(1)	(1)	--	--	(2)	(3)	5.56 (5)
After Couns.		--	–	–	--	--	--	–	--	–

Figures in parenthesis denote no. of subjects Counseling wise $\chi^2_3 = 50.07^{***}$ (P<0.001)

45-55 years and menopausal women are at a high risk of diabetes due to hormonal changes. Mayer *et al* also found that there is a greater incidence of higher levels of blood glucose and diabetes after menopause as compared to pre-menopausal stage.[6] Comparing the data on BMIbasis, obese and underweight subjects were having slightly earlier prediction of diabetes than normal weight group . But the difference found was not significant.

Assessment of Risk Level of Lipid Profile Prior and after Nutrition Counseling

The major problem associated with diabetes is hyperlipidemia. In the development of some diseases, biochemical changes can be expected to occur prior to clinical manifestations. It is therefore always advantageous and proper to have information regarding the effect on lipid profile in response to the treatment either herbal or any other, which may be advocated for control of hyperglycemia. In the present study, observations were recorded for total cholesterol, triglycerides and HDL-C at prior and after the impartation of education and counselling for each of the patientto find out the effect of counselling on risk level of dyslipidemia. The results interpreted as follows:

Total Cholesterol

The total serum cholesterol is one of the most varying parameter of the body. The major sources of cholesterol to the body are both exogenous (i.e. through diet) and endogenous (synthesized in the body). It has both beneficial as well as deterioratory effect on the body.

Table 2 shows the results of per cent distributions of the subjects by the risk factors of cholesterol dyslipidemia. Results prior to counselling revealed that majority of the subjects i.e. 55.55 per cent were at 'high' risk of hyperlipidemia (>240 mg/dl) whereas 21.11 per cent and 23.33 per cent subjects were at 'moderate' and 'low' risk category in stratum I. As compared to stratum I, 64.45 subjects of the stratum II were at 'higher' risk whereas 21.11 and 14.44 per cent subjects were at 'moderate' and 'low' risk of dyslipidemia. Whereas after the counselling a significant (P<0.001) change in per cent subjects in

Table 5 : Percent Distribution of the Diabetics According to the Risk Level of Triglycerides Dyslipidemia, Prior and after Counseling (Stratum II)

Triglycerides (mg/dl)	Risk	Obese		Normal weight		Under weight		Total		Overall
		M	F	M	F	M	F	M	F	
<120		13.33	13.33	20.00	13.33	40.00	33.33	24.44	20.00	22.22
Prior Couns.	Low	(2)	(2)	(3)	(2)	(6)	(5)	(11)	(9)	(20)
After Couns.		60.00	6.67	66.67	73.33	66.67	60.00	64.45	46.66	55.55
		(9)	(10)	(10)	(11)	(10)	(9)	(29)	(30)	(59)
121-160		33.33	20.00	53.33	46.67	33.33	46.67	40.00	37.78	38.89
Prior Couns.	Moderate	(5)	(3)	(8)	(7)	(5)	(7)	(18)	(17)	(35)
After Couns.		26.67	20.00	26.67	20.00	20.00	40.00	24.44	26.67	25.56
		(4)	(3)	(4)	(3)	(3)	(6)	(11)	(12)	(23)
161-200		26.67	26.67	20.00	33.33	20.00	20.00	22.22	26.67	24.44
Prior Couns.	High	(4)	(4)	(3)	(5)	(3)	(3)	(10)	(12)	(22)
After Couns.	Moderate	13.33	13.33	6.66	6.67	13.33	-- (--)	11.11	6.67	8.89 (8)
		(2)	(2)	(1)	(1)	(2)		(5)	(3)	
> 200		26.67	40.00	6.67	6.67	6.67	--	13.34	15.55	14.45
Prior Couns.	High	(4)	(6)	(1)	(1)	(1)	--	(6)	(7)	(13)
After Couns.		--	--	--	--	--		--	--	--

Figures in parenthesis denote no. of subjects Counselling wise $\chi^2_3 = 41.24^{***}$ (P<0.001)

different risk levels was noted in both the strata. The majority of the subjects at the level of 'high risk' changed to 'low risk' level after the counselling. Only 14.45 and 8.89 per cent subjects were at 'high' risk whereas 52.22 per cent and 50.00 per cent were at 'low' risk and 33.33 and 41.11 per cent were at 'moderate' risk from stratum I and II respectively (Table 3).

In sratum I more females (57.78%) are under high risk category of cholesterol dyslipidemia as compared to males (53.33). After counselling significant change in risk level was observed in both males and females. In stratum II equal per cent of males and females are under high risk level of cholesterol dyslipidemia before counselling. But after counselling significant reduction in risk level of dyslipidemia was observed in both male and female.

Triglycerides

At prior counselling level equal per cent of subjects *i.e.* 33.33 and 38.89 per cent from both the strata were at 'moderate risk' whereas 33.33 and 24.44 per cent subjects were at 'high moderate risk' of triglycerides hyperlipidemia. 'High risk' was noted to be in 5.56 per cent and 14.45 per cent subjects of both the strata. Only 27.78 per cent from stratum I and 22.22 per cent subjects from stratum II were at 'low' risk of high lipid triglyceride in blood (Table 4).

Significant (P<0.001) changes were observed with the decrease in per cent subjects in high risk categories of triglycerides dyslipidemia after the counselling. No subject was found to be at 'high moderate' or 'high' risk of triglyceride dyslipidemia in stratum I. Only 8.89 per cent subjects were at 'high moderate' risk from stratum II. Nearly 67.77 and 55.55 per cent of subjects from stratum I and II were at 'low' risk. Thus majority of the subjects were found to be in low risk category after the counselling as compared to prior counselling, where the majority of the subjects were noted at 'moderate to high moderate' risk (Table 5).

Table 6: Percent Distribution of the Diabetics According to the Risk Level Of HDL-C Dyslipidemia, Prior and after Counseling (Stratum I)

HDL-C (mg/dl)	Risk	Obese		Normal weight		Under weight		Total		Overall
		M	F	M	F	M	F	M	F	
< 40										
Prior Couns.	High	26.67 (4)	6.67 (1)	13.33 (2)	13.33 (2)	–	26.67 (4)	13.33 (6)	15.56 (7)	14.45 (13)
After Couns.		26.67 (4)	13.33 (2)	6.67 (1)	--	–	--	11.11(5)	4.44 (2)	7.78 (7)
41 – 60										
Prior Couns.	Moderate	40.00 (6)	66.67 (10)	86.67 (13)	66.67 (10)	80.00 (12)	53.33 (8)	68.89 (31)	62.22 (28)	65.55 (59)
After Couns.		40.00 (6)	73.34 (11)	86.67 (13)	86.67 (13)	80.00 (12)	80.00 (12)	68.89 (31)	80.00 (36)	74.45 (67)
> 60										
Prior Couns.	Low	33.33 (5)	26.66 (4)	– 6.66 (1)	20.00 (3)	20.00 (3)	20.00 (3)	17.78 (8)	22.22 (10)	20.00 (18)
After Couns.		33.33 (5)	13.33 (2)		13.33 (2)	20.00 (3)	20.00 (3)	20.00 (9)	15.56 (7)	17.77 (16)

Figures in parenthesis denote no. of subjects Counselling wise χ^2_2= 4.30^{NS}

HDL-C

Table 6 reveals clearly that in stratum I 65.55 and 20.00 per cent subjects were at 'moderate' and 'low risk' level with 14.45 per cent subjects at high risk level of HDL-C dyslipidemia prior to counselling. Comparing with after counselling data 7.78 per cent subjects were at 'high risk' with shift of majority of subjects in 'moderate' risk category. Reduction was also seen in low risk category with 17.77 per cent subjects. The change in per cent subjects was noted to be non significant after the counselling.

Nearly same figures were seen at different risk level category in stratum II also. 21.11 per cent and 64.44 per cent subjects were at 'high'

Table 7: Percent Distribution of the Diabetics According to the Risk Level Of HDL-C Dyslipidemia, Prior and after Counseling (Stratum II)

HDL-C (mg/dl)	Risk	Obese		Normal weight		Under weight		Total		Overall
		M	F	M	F	M	F	M	F	
<40										
Prior Couns.	High	26.67 (4)	26.67 (4)	20.00 (3)	20.00 (3)	13.33 (2)	20.00 (3)	20.00 (9)	22.22 (10)	21.11 (19)
After Couns.		26.67 (4)	33.33 (5)	13.33 (2)	--	6.67 (1)	--	15.55 (7)	11.11 (5)	13.33 (12)
41-60										
Prior Couns.	Moderate	53.33 (8)	53.33 (8)	73.33 (11)	66.67 (10)	73.34 (11)	66.67 (10)	66.67 (30)	62.22 (28)	64.44 (58)
After Couns.		46.66 (7)	53.33 (8)	66.67 (10)	86.67 (13)	86.66 (13)	86.67 (13)	66.67 (30)	75.56 (34)	71.11 (64)
> 60										
Prior Couns.	Low	20.00 (3)	20.00 (3)	6.67 (1)	13.33 (2)	13.33 (2)	13.33 (2)	13.33 (6)	15.56 (7)	14.45 (13)
After Couns.		26.67 (4)	13.34 (2)	20.00 (3)	13.33 (2)	6.67 (1)	13.33 (2)	17.78 (8)	13.33 (6)	15.56 (14)

Figures in parenthesis denote no. of subjects Counselling wise χ^2_2= 1.91^{NS}

and 'moderate' risk with only 14.45 per cent in low risk category prior to counselling. With non significant variation in per cent subjects after the counselling, 15.56 per cent were at low risk and 71.11 per cent and 13.33 per cent subjects were at 'moderate' and 'high risk' of HDL-dyslipidemia (Table 7).

The conclusion drawn from the complete lipid profile data is that BMI wise prior to counselling the incidence of dyslipidemia was noted to be higher in obese group as compared to the normal weight and underweight groups. Further comparing stratum I and II, the levels of dyslipidemia was found to be higher in stratum II subjects. The reason may be due to the longer duration of the disease of stratum II subjects. Whereas after the counselling except for HDL-C significant decrease in serum cholesterol and triglycerides was noted in both the strata in all BMI groups.

Conclusion

Thus the overall view of data regarding serum cholesterol and serum triglycerides stated that prior to counselling subjects were at 'high' and 'high moderate risk' of dyslipidemia, respectively. Further, subjects of stratum II were noted for significantly ($P<0.01$) higher levels of serum cholesterol and triglycerides prior to counselling. But impact of counselling was clearly noted by the significant ($P<0.005$) decrease in the levels, with majority of the subjects noted for 'low risk' of hyperlipidemia for both serum cholesterol and triglycerides level. The difference in between the two strata was non significant after the counselling. A non significant difference in HDL-C level of the subjects was noted within and in between the two strata with 'moderate risk' of hyperlipidemia noted at both prior and after the counselling.

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Original Article

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To Investigate the Dietary Pattern and Nutritional Status of Adolescent Girls and Boys of HIG And MIG in Indore City

Bhanupriya Trivedi

Abstract

To investigate the dietary pattern and nutritional status of adolescent girls and boys of HIG and MIG in Indore city; A total of 500 girls and boys, aged from 18-21 years, in Indore city were selected by systematic random sampling method. Nutrient intake was assessed using the 24-h recall method and the usual pattern of food intake was examined using a 7-day food frequency questionnaire. The result reveals that 99.2 % and 0.8 % of adolescent girls and boys were vegetarian and non-vegetarian or ova-vegetarian in MIG groups compared to 45.2 % and 54.8 % HIG group respectively. Also, 28.8 %, 46.4 % and 24.8 % of adolescent girls and boys of MIG were taking food in two, three and four times per day as compared to 2.4 %, 44.4 % and 53.2 % adolescent girls and boys in HIG respectively. It was observed that 57.6 %, 29.2 % and 13.2 % of adolescent girls and boys were taking food in 4hrs, 6hrs and 8 hrs intervals in a day in MIG group as compared to 65.2 %, 34.8 % in HIG group respectively. It was also observed that 47.2 % and 52.8 % of adolescent girls and boys were having certain and uncertain time of eating meals in MIG group as compared to 66.8 % and 33.2 % in HIG group. Also, nutrient intake of energy, carbohydrate, protein, fat, calcium and phosphorus of adolescent girls and boys was 1907.9 kcal, 234.1 g, 40.3 g, 33.4 g, 996.8 mg and 1110.7 mg in MIG group as compared to 2226.4 kcal, 252.2 g, 47.7 g, 44.9 g, 1061.3 mg and 1128.2 mg in HIG group.

Keywords: Adolescent; Dietary pattern; Socio income group.

Introduction

Regular breakfast eating (RBE) has been identified as an important factor in nutrition, especially during growth. Eating breakfast regularly is also an important contributor to a healthy lifestyle and health status. RBE has been shown to contribute significantly to children's daily nutrient intake and nutritional well-being and to affect the adequacy of their total daily intake. Over the past decade, public health institutions around the world have placed increased emphasis on the importance of healthy lifestyles.

Author's affiliation: *Research Scholor, Home Science, Govt. Maharani Laxmi Bai Girls PG College, Fort, Indore, M.P., India.

Corresponding Author: Mrs. Bhanupriya Trivedi, 19, Dilip Singh Colony, Shankar Baag, Marimata Square, Indore (M.P) Pin- 452006, India.

E-mail: bhanupriyasharma1987@gmail.com

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Objectives

To investigate the dietary pattern and nutritional status of adolescent girls and boys of HIG and MIG in Indore city.

Hypothesis

There shall be no significant difference in the dietary pattern and nutritional status of adolescent girls and boys of HIG and MIG in Indore city.

Materials and Methods

This entire study was conducted in Indore City. In this research study 500 adolescent girls and boys of age 18-21 years were selected by purposive random sampling technique. Nutrient intake was determined by 24 hour recall method. In this study, a structured questionnaire was used regarding dietary

Table 1: Distribution of Adolescent Girls and Boys of MIG and HIG Based on Food Belief

Food belief	MIG		HIG		'Chi' Value (λ^2)
	No	%	No	%	
Veg	248	99.2	113	45.2	72.64**
Non Veg/ Ova-veg	2	0.8	137	54.8	

df = 1

intake and the usual pattern of food intake was examined using a 7-day food frequency questionnaire. Statistical analysis was done by using statistical tools like Z-test, mean, standard deviation, percentage, chi square test etc.

Results

Table 4.8 reveals that 99.2 % of adolescent girls and boys were vegetarian and non-vegetarian or ova-vegetarian in MIG groups as compared to 45.2 % and 54.8 % HIG group respectively. Highly significant difference was observed between the two groups in their percentages with a Chi-value of 72.64 ($P < 0.05$), which implies that frequency of occurrence of the food pattern in adolescent girls and boys in both the groups was different. Non-Vegetarian foods are more costly as compared to vegetarian foods and it is the reason that more non- vegetarian adolescent girls and boys belonging to HIG groups consumed more fleshy foods as compared to MIG family. It was observed that income matters a lot in food choices.

Table 4.9 reveals that 28.8 %, 46.4 % and 24.8 % of adolescent girls and boys of MIG were taking food in two, three and four times

Table 2: Distribution of Adolescent Girls and Boys of both MIG And HIG Based on Number of Meals/Day

No. of meals/day	MIG		HIG		'Chi' Value (λ^2)
	No	%	No	%	
Two	72	28.8	6	2.4	32.72**
Three	116	46.4	111	44.4	
Four	62	24.8	133	53.2	

df =2

Table 3: Distribution of Adolescent Girls and Boys of both MIG and HIG Based on Time Gap between Meals in a Day

Time gap between meals in a day	MIG		HIG		Chi- Value (λ^2)
	No	%	No	%	
4 Hrs.	144	57.6	163	65.2	14.16**
6 Hrs.	73	29.2	87	34.8	
8 Hrs.	33	13.2	nil	nil	

df =2

per day as compared to 2.4 %, 44.4 % and 53.2 % adolescent girls and boys in HIG respectively. Highly significant difference was observed between the two groups in their percentages with a Chi-value of 32.72 ($P < 0.05$), which implies that frequency of number of meals in both the groups was different which is similar to Johns *et al* (2001); who found that the role of snacking as a causative factor in the increased prevalence of overweight in children is not clear. The most significant change in snacking behavior for children over the past two to three decades has been the greater number of snacking occasions per day, not the amount of energy consumed per snack. It was observed from the data that frequent consumption of meals may be one of the reasons behind slight increase in weight of HIG adolescent girls and boys. Though consumption of small and frequent meals help to maintain healthy weight but due to lack of activity this small and frequent meal consumption had shown slight negative impact on weight of HIG adolescents. So input and output of energy is very important in weight management.

Table 4.10 reveals that 57.6 %, 29.2 % and 13.2 % of adolescent girls and boys were taking food in 4hrs, 6hrs and 8 hrs intervals in a day in MIG group as compared to 65.2 %, 34.8 %

Table 4: Distribution of Adolescent Girls and Boys of both MIG and HIG Based on Meal Eating Time

Meal eating time	MIG		HIG		'Chi' Value (λ^2)
	No	%	No	%	
Certain	118	47.2	167	66.8	4.84**
Uncertain	132	52.8	83	33.2	

df =1

Table 5: Distribution of Adolescent Girls and Boys in MIG and HIG as Per Their Nutrient Intake

Nutrient	MIG		HIG		Z-Value
	Mean	SD	Mean	SD	
Energy (kcal)	1907.9	257.6	2226.4	198.3	15.49**
Carbohydrate (gm)	234.1	25.5	252.2	18.0	9.15**
Protein (gm)	40.3	7.0	47.7	6.6	11.34**
Fat (gm)	33.4	5.7	44.9	6.4	19.93**
Calcium (mg)	996.8	116.7	1061.3	113.5	5.73**
Magnesium (mg)	258.7	18.8	256.3	15.3	1.57 NS
Phosphorus (mg)	1110.7	90.9	1128.2	77.4	2.32**

in HIG group respectively. Highly significant difference was observed between the two groups in their percentages with a chi-value of 14.16 ($P < 0.05$), which implies that frequency of occurrence of the time gap between meals in both the groups was different. Availability of varieties of food products depends on economic condition as in above result it was observed that less gap between meals was more in HIG group as compared to MIG family's adolescent girls and boys.

Table 4.12 reveals that 47.2 % and 52.8 % of adolescent girls and boys were having certain and uncertain time of eating meals in MIG group as compared to 66.8 % and 33.2 % in HIG group. Highly significant difference was observed between the two groups in their percentages with a Chi-value of 4.84 ($P < 0.05$), which implies that frequency of occurrence of meal time in both the groups was different. Cutler GJ, Flood A *et al* (2011); conducted a research study to find the association between meal eating time and weight status in adolescents. Result reveals highly significant association. It was observed certainty in diet routine leads to proper digestion and absorption of food which leads to proper weight management.

Table 4.21 reveals highly significant difference ($P < 0.05$) for intake of energy, carbohydrate, protein, fat, calcium and phosphorus of adolescent girls and boys with 1907.9 kcal, 234.1 g, 40.3 g, 33.4 g, 996.8 mg and 1110.7 mg in MIG group as compared to 2226.4 kcal, 252.2 g, 47.7 g, 44.9 g, 1061.3 mg and 1128.2 mg in HIG group, respectively, with a Z- value of 15.49, 9.15, 11.34, 19.93, 5.73 and 2.32 respectively. Whereas, non-significant difference ($P > 0.05$) for magnesium level was observed between adolescent girls and boys in MIG and HIG. Nicklas *et al* (2004); showed that larger portions provide more energy and encourage people to eat more calories. Quantity of each and every nutrient was comparatively high in HIG adolescents than MIG adolescents. It can be assumed that economy plays a very important role in our day to day life including our diet routine.

Conclusion

The findings indicate that the dietary pattern and nutritional status of adolescent girls and boys of HIG and MIG in Indore city shows highly significant difference ($P < 0.05$) for intake of energy, carbohydrate, protein, fat, calcium and phosphorus and Highly significant difference was observed between the two groups in their percentages with a Chi-value of 4.84 ($P < 0.05$), which implies that

frequency of occurrence of meal time in both the groups is different. Also, it was observed that frequency of number of meals in both the groups is different. Highly significant difference was observed between the two groups in their percentages with a Chi-value of 72.64 ($P < 0.05$), which implies that frequency of occurrence of veg, non veg and ovo veg of the adolescent girls and boys in both the groups is different. There was also a relationship between the family incomes with the nutritional status of the adolescents.

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Original Article

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Beverage Intake among Adolescent Girls and Boys of HIG and MIG

Tahera Khan*, Nandini Rekhade**

Abstract

To investigate the beverage intake of adolescent girls and boys food intake was examined using a 7-day food frequency questionnaire of HIG and MIG in Indore city. A total of 500 girls and boys, aged from 18-21 years, residing in Indore city were selected by systematic random sampling method. Nutrient intake was assessed using the 24-h recall method and the usual pattern of food intake was examined using a 7-day food frequency questionnaire. The result reveals that Non-significant difference ($P > 0.05$) was observed for alcohol intake, Significant difference ($P < 0.05$) was observed between the two groups ($P < 0.05$) for fruit juice and non-significant difference ($P > 0.05$) for coffee or tea in the food habits of adolescent girls and boys in MIG and HIG groups. Highly significant difference ($P < 0.05$) was observed for skimmed milk, butter milk, whole milk, in the food items of adolescent girls and boys in MIG and HIG group.

Keywords: Skimmed milk; Butter milk; Whole milk; Adolescent girls and boys.

Introduction

To protect body from dehydration it is very important to include plenty of beverages in day to day routine. Also, it is observed that adequate fluid intake regulates body temperature and avoid many health issues. To understand beverage intake of adolescents of Indore city the following research was done with below objective.

Objectives

To investigate the dietary pattern and nutritional status of adolescent girls and boys of HIG and MIG in Indore city

Materials and Methods

This entire study was conducted in Indore City. In this research study 500 adolescent girls and boys of age 18-21 years were selected by purposive random sampling technique. Nutrient intake was determined by 24 hour recall method. In this study, a structured questionnaire was used regarding dietary intake and the usual pattern of food intake was examined using a 7-day food frequency questionnaire. Statistical analysis was done by using statistical tools like Z-test, mean, standard deviation, percentage, chi square test etc.

Results

Table 1 reveals that 100 % of adolescent girls and boys were not taking all the soya milk in MIG group as compared to 14.4 %, 14.4 % and 71.2 % weekly, monthly and not at all in HIG group respectively. Also the table reveals that 16.0 %, 37.2 %, 9.2 % and 37.6 % of adolescent girls and boys were taking tea once a day, tea twice a day, coffee once a day and not at all in MIG group as compared to 27.2

Author's affiliation: *Research Scholor, **Professor, Child Development, Home Science, Govt. Maharani Laxmi Bai Girls PG College, Fort, Indore, M.P., India.

Corresponding Author: Tahera Khan, Bhandari Hospital and Research Centre, 21, Ground Floor, Scheme No. 54, Opposite Meghdoot Garden, Indore M.P. Pin - 452010, India.

E-mail: tahirakhan03@gmail.com

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Table 1: Distribution of Adolescent Girls and Boys in MIG and HIG as per their Beverage Intake

Beverage intake	Indices	MIG		HIG		Chi- Value (λ^2)
		No	%	No	%	
Alcohol	No	247	98.8	240	96	**1.55 NS**
	Yes	3	1.2	10	4	
Aerated drinks	No	111	44.4	162	64.8	**8.39****
	Yes	139	55.6	88	35.2	
Soya milk	Daily	-	-	-	-	**33.6****
	Twice a day	-	-	-	-	
	Twice a Week	-	-	-	-	
	Weekly	-	-	36	14.4	
	Monthly	-	-	36	14.4	
	Occasionally	-	-	-	-	
	Not at all	250	100	178	71.2	
Tea or Coffee	Tea once a day	40	16.0	68	27.2	**7.23 NS**
	Tea Twice a day	93	37.2	64	25.6	
	Coffee once a day	23	9.2	26	10.4	
	Coffee twice a day	-	-	5	2.0	
Fruit Juice	Not at all	94	37.6	87	34.8	**150.9****
	Daily	1	0.4	43	17.2	
	Twice a day	1	0.4	-	-	
	Twice a Week	-	-	42	16.8	
	Weekly	26	10.4	71	28.4	
	Monthly	119	47.6	-	-	
	Occasionally	91	36.4	-	-	
Skimmed Milk	Not at all	12	4.8	94	37.6	**28.8****
	Daily	128	51.2	54	21.6	
	Twice a day	-	-	22	8.8	
	Twice a Week	5	2.0	-	-	
	Weekly	3	1.2	14	5.6	
	Monthly	-	-	-	-	
	Occasionally	-	-	-	-	
Skimmed Milk Curd	Not at all	114	45.6	160	64.0	**15.2***
	Daily	24	9.6	6	2.4	
	Twice a day	-	-	-	-	
	Twice a Week	11	4.4	-	-	
	Weekly	10	4.0	30	12.0	
	Monthly	-	-	3	1.2	
	Occasionally	3	1.2	-	-	
Butter Milk	Not at all	202	80.8	211	84.4	**66.8****
	Daily	16	6.4	-	-	
	Twice a day	-	-	-	-	
	Twice a Week	6	2.4	10	4.0	
	Weekly	11	4.4	76	30.4	
	Monthly	10	4.0	76	30.4	
	Occasionally	103	41.2	54	21.6	
Whole Milk	Not at all	104	41.6	34	13.6	**34.8****
	Daily	16	6.4	76	30.4	
	Twice a day	-	-	23	9.2	
	Twice a Week	3	1.2	-	-	
	Weekly	-	-	-	-	
	Monthly	-	-	-	-	
	Occasionally	8	3.2	-	-	
	Not at all	223	89.2	151	60.4	

%, 25.6 %, 10.4 %, 2.0% and 34.8 % tea once a day, tea twice a day, coffee once a day, coffee twice a day and not at all in HIG group respectively; whereas, 0.4 %, 0.4 %, 10.4 %, 47.6 %, 36.4 % and 4.8 % of adolescent girls and boys were taking fruit juice daily, twice a day, weekly, monthly, occasionally and not at all in MIG group as compared to 17.2 %, 16.8 %, 28.4 % and 37.6 % daily, twice a week, weekly and not at all in HIG group respectively. Result also reveals that 51.2 %, 2.0 %, 1.2 % and 45.6 % of adolescent girls and boys were taking skimmed milk daily, twice a week, weekly and not at all in MIG group as compared to 21.6 %, 8.8 %, 5.6 % and 64.0 % daily, twice a day, weekly and not all in HIG group respectively; It was observed that 6.4 %, 2.4 %, 4.4 %, 4.0 %, 41.2 % and 41.6 % of adolescent girls and boys were taking butter milk daily, twice a week, weekly, monthly, occasionally and not at all in MIG group as compared to 4.0 %, 30.4 %, 30.4 %, 21.6 % and 13.6 % twice a week, weekly, monthly, occasionally and not at all in HIG group respectively; whereas, 6.4 %, 1.2 %, 3.2 % and 89.2 % of adolescent girls and boys were taking whole milk daily, twice a week, occasionally and not at all in MIG group as compared to 30.4 %, 9.2 % and 60.4 % daily, twice a day and not at all in HIG group respectively. It was also found that 55.6 % of MIG adolescent girls and boys were taking aerated drinks and 44.4% were not taking whereas 35.2% of HIG adolescent girls and boys were taking aerated drinks and 64.8% were not taking. It was observed that 1.2 % of MIG adolescent girls and boys were taking alcohol and 98.8% were not taking alcohol whereas 4.0% HIG adolescent girls and boys and girls were taking alcohol and 96.0% were not taking.

Conclusion

The findings indicate that Significant difference ($P < 0.05$) was observed between the two groups in their percentages with a Chi-value of 33.6, 71.2 and 51.1 for soya milk; Which implies that frequency of consumption of soya milk in both the groups is different. Also, highly significant difference ($P < 0.05$) was observed for fruit juice and non-significant difference ($P > 0.05$) for coffee or tea in the food habits of adolescent girls and boys in MIG and HIG groups; Which implies that frequency of consumption of beverages in both the groups is different. Result also reveals that highly significant difference ($P < 0.05$), was observed between the two groups in their percentages with a Chi-value of 28.8, 15.2, 66.8, 34.8, 44.9, 53.0 and 21.5 for skimmed milk, butter milk, whole milk, respectively, which implies that frequency of consumption of milk and milk beverages in both the groups is different. Also, significant difference ($P < 0.05$) was observed between the two groups in their percentages with a Chi-value 8.39 for consumption of aerated drinks respectively, which implies that frequency of occurrence of the adolescent girls and boys in both the groups is different. Non-significant difference ($P > 0.05$) was observed for alcohol, of adolescent girls and boys in the both groups.

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Original Article

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Constrains of Exclusive Breast Feeding among First Time Middle and High Income Group Mothers

Shivani Lodha*, Vandana Bharti**

Abstract

Breast feeding is the optimum form of infant nutrition. Breast milk fully meets the requirements of the infant in the first few months of life. The objective of the study was to assess the factors that limit the mother to practice exclusive breast feeding. **Material and Methods:** 200 first time mothers belonging to middle and high income group families were enrolled for the study using purposive sampling method. A pretested semi-structured open ended questionnaire was used to collect data. An informal interview method was used to gather information about breast feeding practices. **Results:** 187 mothers breast fed their babies and 13 mothers never breast fed their babies. Amongst mothers who were breast feeding their babies, 35% mothers were practicing exclusive breast feeding (EBF), 35% mothers practiced Predominant Breast Feeding and 30% mothers practiced Mixed Breast Feeding. Mode of delivery significantly affected the exclusive breast feeding rates and time of initiation of breast feeding ($P<0.05$). **Conclusion:** Initiation and continuation of breastfeeding is influenced by a complex interplay of culture, social support, and socioeconomic status. The erosion in the value of breastfeeding, lack of accurate and unbiased information on optimum infant feeding practices, and inadequate support to breastfeeding mothers are some of the factors responsible for poor rates of infant feeding practices.

Keywords: Breast feeding practices; Exclusive breast feeding; Breast milk, Bottle feeding.

Introduction

Breastfeeding is the optimal form of infant nutrition. Breast milk fully meets the requirements of the infant in the first few months of life. It contains antimicrobial factors that provide protection against diarrheal diseases and respiratory infections. Early initiation of breast feeding is important as early breast milk contains all essential nutritive and immunological factors and ensures the development of oxytocin reflexes. The beneficial effects of breastfeeding depend on breastfeeding initiation, its duration, and the age at which the breast-fed child is weaned. It has been rightly said that breast feeding acts as first immunization.[1]

Author's affiliation: Dept. of Home Science, Government Maharani Laxmibai Post Graduate Girls College, Indore, MP, India.

Corresponding Author: Shivani Lodha, Department of Home Science, Government Maharani Laxmibai Post Graduate Girls College, Indore, M.P., India.

E-mail: Shivanilodha@gmail.com

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For newborn infants, the World Health Organization (WHO) and United Nations International Children's Emergency Fund (UNICEF) endorse breastfeeding as an integral part of the reproductive process, the natural and ideal way of providing complete nutrition, and a process that provides a unique biological and emotional basis for child development.

As a public health measure, the Global Strategy for Infant and Young Child Feeding jointly developed by WHO and UNICEF recommend initiation of breastfeeding within an hour of birth and exclusive breastfeeding for six months for all infants.[5] This position was reaffirmed in 2011. For a child to be exclusively breastfed there should be no prelacteal intake of anything solid or liquid other than breast milk, medications or vitamins. Giving a child any amount of water, gripe water, juice or porridges not considered "exclusive breastfeeding." This recommendation is worldwide, applying to infants of mothers in low- as well as high-income countries.[2]

Adequate breastfeeding could save many

young lives. Breast feeding is the object of research worldwide, considering the various aspects of breast milk and breast feeding. Despite all the scientific advancement and dissemination of the superiority and advantages of human milk, breast feeding rates are below recommended. Globally less than 40% of infants under six months of age are exclusively breastfed. In India 51% of the mothers will not give colostrum to the newborn soon after birth.[3] According to NFHS-3 survey, in India, 46% of the under 3 year of age children are underweight and 38% are stunted.[4] Lack of exclusive breast feeding and improper breast feeding is one of the major contributory factors for this high prevalence of malnutrition and its associated morbidities and mortality. Promotion of exclusive breast feeding practices for the first six months of life is one of the most effective interventions for reducing infant morbidity and mortality.[5]

The probability of initiating breast feeding is a complex function of individual, social, cultural and clinical factors. Poor implementation on importance of breast feeding and lack of adequate professional training in breast feeding promotion strategies as well as inadequate practices in maternities and neonatal units as well as doctor clinics have been proposed as a barrier for optimal breast feeding rates.[6]

Breast-feeding improves the health and development of both the mother and infant. Therefore, assessment of feeding soon after birth is crucial with regard to infant growth and development and prevention of diseases in adulthood.[7] Healthcare providers working with mothers and infants should understand the patterns of growth and development of exclusively breast-fed infants, correctly assess the effectiveness of breast-feeding, and provide continuous support so that both the mother and infant benefit from breast-feeding.[8] For having a good practices related to breast feeding and to save the many infant lives, it is essential to have proper knowledge regarding the breast feeding practices. The main objective to conduct this research was to find out the factors that hinder the rates of exclusive breast feeding and also to assess the need of health care workers in lactation management counseling in antenatal and post natal period.

Methodology

Present study was carried out at the pediatric clinic in Indore city, Madhya Pradesh. Mothers who came for regular check up of their babies younger than 6 months of age were taken as sample for the study. Subjects were selected using purposive sampling method. 200 First time mothers were enrolled for the study with their consent. Mothers belonging to middle and high income group families participated in the study.

A pretested semi-structured open ended questionnaire was used to collect data. An informal interview method was used to gather information about breast feeding practices. Questionnaire was filled by the interviewer. During the interview English as well as Hindi language was used.

Questions related primarily to demographic characteristics such as mother's age, occupation, type of family, bottle feeding practices time of initiation of breast feeding, prelacteal feeding practices were recorded under quantitative data. Responses such as how to assess a breast feed or top feed, reason for introducing other milk etc., were recorded under qualitative data.

Exclusion criteria- Mothers of infants who were born premature, Very Low Birth Weight Baby, infant suffering from inborn error of metabolism or primary lactose intolerance was not included in the study.

Working Definition

1. *Exclusive Breast Feeding (EBF):* An infant receives only breast milk from his or her mother or a wet nurse or expressed breast milk, and no other liquids or solids not even water. The only exceptions

include administration of oral rehydration solution, oral vaccines, vitamins, mineral supplements or medicines.

2. *Predominant Breast Feeding (PBF):* Proportion of infants 0-5 months of age who receive breast milk as the predominant source of nourishment but also receive other fluids except non human milk.
3. *Mixed Breast Feeding (MBF):* Proportion of infants 0-5months of age who receive both breast milk as well as other milk for feeding.
4. *Timely initiation of Breast Feeding:* Baby must be put to breast within half an hour of normal delivery and within four hours after C-Section delivery. Any Prelacteal feed should not be given.

The qualitative and quantitative strands of data were analyzed separately. Data was analyzed using SPSS 21 Software. Mean and percentage was used. For Chi Square test p value of < 0.05 was considered as significant.

Results

The mean age of respondents was found to be 26 years (range 24-32 years). All mothers were first time pregnant mothers belonging to middle income and high income group families. Amongst mothers, 44% mothers had C- Section delivery whereas 56% mothers delivered their babies through normal delivery. Other demographic characteristics are shown in Table 1.

Table 1: Demographic Characteristics

Variables	Frequency
Mother's Education	
• Post Graduate	56
• Graduate	127
• Under Graduate	17
Mother's Occupation	
• Housewife	151
• Working	49
Family type	
• Nuclear	106
• Extended	94
Type of delivery	
• Normal delivery	113
• C-section delivery	87

Table 2: Mode of Delivery * Type of Breast Feeding

Type of delivery	Type of breast feeding			
	Exclusive BF	Predominant BF	Mixed BF	Never BF
Normal delivery	63	23	26	1
C- Section Delivery	6	36	33	12

Chi square value 57.64, p<0.05

Breast milk is the natural nutrition for all children. 187 mothers breast fed their babies and 13 mothers never breast fed their babies. Amongst mothers who were breast feeding their babies, 35% mothers were practicing exclusive breast feeding (EBF) whereas 30% mothers were offering breast milk and other milk to infants. 35% mothers were practicing predominant breast feeding (PBF). Out of 87 mothers, who delivered their babies through C-Section, only 6% mothers practiced EBF till 6 months of age, whereas 41% mothers practiced PBF. On the other side, 113 mothers had normal delivery, out of which 56%

Table 3: Mode of Delivery * Feeding Top Milk First 3 Days

Type of delivery	Feeding Other milk first 3 days post delivery	
	Yes	No
Normal Delivery	44	69
C- Section Delivery	81	75

Chi Square – 61.53 (p<0.05)

Table 4: Reason for Giving Other Milk First 3 Days

Reasons (n = 131)	Percent (n)
Milk not sufficient	43 (56)
Elders advise	34 (44)
Hospital advises	13 (17)
Pain in stiches	5 (6)
C- Section delivery	5 (6)

Table 5: Type of Family* Type of Breast Feeding

Type of Family	Type of breast feeding			
	Exclusive BF	Predominant BF	Mixed BF	Never BF
Nuclear Family	32	35	31	8
Extended Family	37	24	28	5

Chi Square- 2.547 p> 0.05

Table 6: Reason for Giving Top Milk

Reason for giving other milk now (n = 72)	Percentage (n)
Not sufficient milk	46 (33)
Convenience	8 (6)
force by family members	6 (4)
Working	28 (20)
Baby cries a lot	12 (9)

Table 7: Assessing Breast Feeding and Top Milk

Assessing breast feeding/top feeding (n = 200)	Percentage (n)
Stops Feeding	48 (95)
Don't know	22 (44)
Sleeps while sucking	5 (10)
Stops crying	11 (23)
Weight gain	1 (3)
Fixed amount	13 (25)

mothers practiced EBF. 23% mothers preferred giving both breast milk and other milk to their infants. Hence it was found that type of delivery significantly affects the breast feeding practices (P< 0.05) (Table 2).

Many mothers and her family practice giving either cow's milk or formula milk during first 3 days of delivery. most common explanation given by mothers for introducing other milk apart from breast milk was " Not sufficient milk for babies" (43%) and "advised by elders in the family" (34%)(Table 3). 13% mothers offered top milk because hospital staff recommended. Mothers who had C-Section delivery were more likely to give top milk other than breast milk. None of the mothers were giving any pre lacteal feeds (Table 4).

Time of initiation of breast feeding post-delivery plays a very important role. 59% mothers initiated breast feeding within one hour of birth whereas 23% mothers initiated breast feeding after 12 hours of delivery. Nearly 50% mothers who had C- Section

Figure 1: Mode of Delivery* Initiation of Breast Feeding

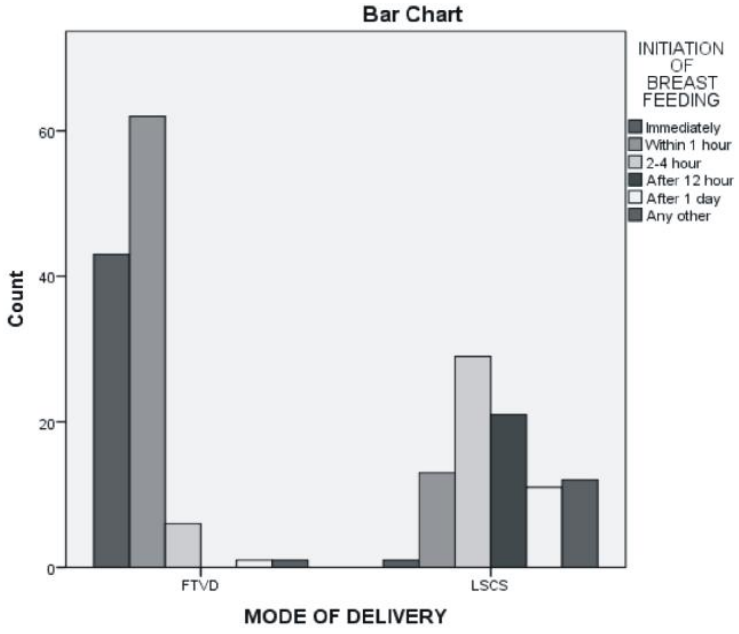

Table 8

Parameters	Percentage (n)
Bottle feeding (n = 200)	
• Yes	32 (63)
• No	68 (137)
Sterilization of bottle (n = 63)	
• Yes	84 (53)
• No	10 (16)
Material of bottle nipple (n = 63)	
• Food grade Plastic	73 (46)
• Silicon	27 (17)
Counseling received regarding BF (n = 200)	
• Yes	34 (67)
• No	66 (133)
Feel the need of counseling (n = 200)	
• Yes	68 (136)
• May be	27 (55)
• No	5 (9)
Reason for using bottle for feeding (n = 63)	
• Convenience	43 (27)
• Family advises	6 (4)
• Less work	11 (7)
• Accepts well from bottle	40 (25)

delivery initiated breast feeding after 4-6 hours of delivery. The type of delivery (normal or C-Section) significantly affects the timely introduction of breast feeding to babies ($p< 0.05$) (Figure 1).

83% mothers interviewed belonged to nuclear family whereas 47% mothers stayed in joint or extended family. It was observed that type of family did not have a significant effect on breast feeding practices ($p>0.05$).

Amongst mothers who were giving top milk other than breast milk, cow's milk (56%) was the preferred milk followed by infant formula milk (32%). During the informal interview, mothers were questioned "why they offered top milk to their infants or why didn't they continue EBF". 49 mothers were employed or working out of home and preferred giving top milk since they had no option. Also perception of not producing sufficient milk for the baby was another reason quoted by mothers for introducing top milk. (Table 6).

Respondents were also asked about the signs or indicators by which they assess whether breast milk or top milk was enough for her child. According to 48% mothers when "baby stops sucking on breast means milk was enough for the child". "Infant stops crying" (12%) and "sleeps while sucking" (5%) were also recorded (Table 7).

32% mothers were using bottle to feed their babies. 46 mothers were using food grade plastic nipple while 17 mothers were using silicon nipples for bottle feeding. Convenience and accepts well from bottle were the main reason for using bottle as feeding source (Table 8).

Breast feeding education to mothers is one of the most important factor which will enhance correct breast feeding practices. 67% mothers did not receive any counseling regarding breast feeding during antenatal or postnatal period. 68% mothers felt that proper education regarding infant and young child feeding would have been helpful whereas 28% mother were not sure regarding the same (Table 8).

Discussion

In our study only 35% mothers were

practicing exclusive breast feeding. Several studies have stressed the importance of exclusive breastfeeding during the first six months of infant life and its social, economic and health benefits. Out of 287 mothers selected for this study, 174 (61%) exclusively breastfeeding until six months after delivery.[9] Among the 593 infants in this study, 24.1% had complimentary feeding since birth, and only 10 mothers exclusively bottle-fed their infants (1.7%). About a quarter of the infants were exclusively breastfeeding and about half of them were predominantly breastfed since birth. The percentage of infants who were either exclusively or predominantly breastfed for or 6 month was calculated, the results showed that 7.4% (n=44) of the infants were exclusively breastfed for 4 months while only 1.9% (n=11) breastfed exclusively for 6 months. Moreover, the percentage of infants who were predominantly breastfed for 4 months was 18.0, and the percentage of infants who were predominantly breastfed for 6 months was 7.1%.[10]

Most of the mothers studied (50.0%) initiated breast feeding with in 1 hour of birth and 23.4% could initiate breast feeding within 2-6 hours and others (26.6%) delayed beyond 6 hours. The timely first suckling rate was 0.53. Median time at initiation of breast feeding was found to be 2 hours. In the present study, the ever breast-fed rate was 100%. No milk production (45.2%), followed by caesarian section (28.6%) and advice of elderly person of the family (14.3%) were mainly found to be responsible for the delay in initiating the breast feeding.[11]

In our study, only 6% mothers practiced EBF who had C-Section delivery. Nearly half of the mothers initiated breast feeding after 4-6 hours of delivery. The type of delivery plays a role in the initiation of breast milk. The women who underwent C-section have delayed the initiation of breast milk when compared to the women who delivered normally. Thus, these two factors clearly show statistically significant association with the initiation of breast milk.[11] Factors that influenced the breastfeeding period were: new pregnancy, work demands (gardening, marketing, housework, and professional careers), child choice, needing to go back to their studies, and family problems.[12]

Accoridng to Manjunath *et al* Bottle feeding is in vogue.[13] 32% mothers were using bottle to feed their babies. Although bottle feeding is widely practiced and accepted in western world, in the developing countries this practice should not be encouraged due to the associated risks of infections and contaminations of the feeds. The introduction of bottle leads to nipple confusion and the maternal milk output begins to decrease prematurely. According to Collins *et al*, feeding bottle interferes with breast feeding success. Bottles may interfere with establishing successful breastfeeding, possible because of the difference in the suckling action required for breast versus an artificial nipple .[14]

Percentage of mothers giving other milk apart from breast milk during first 3 days as well as throughout the period of 6 months along with breast feeding was high in the study. In a study, of breastfeeding was found to be low (43%).[15] This may be due mainly to the existing traditional beliefs and practices in the rural community. It appears that the belief that breast milk "does not come down" before the third day is still prevalent.[16] Early initiation Breastfeeding was perceived as essential to baby's health. It strengthens the physical and spiritual bond between mothers and their children. Exclusive breastfeeding was considered essential but demanding. Only a small proportion (19%) of the nursing mothers practiced exclusive breastfeeding. The survey showed the major constraints to exclusive breastfeeding to be: the perception that babies continued to be hungry after breastfeeding (29%); maternal health problems (26%); fear of babies becoming addicted to breast milk (26%); pressure from mother-in-law (25%); pains in the breast (25%); and the need to return to work (24%).[17]

In the present study, according to 48% mothers when infants stop sucking, breast milk or top milk was enough. Ninety one

percent (n = 128) of mothers breastfed their babies when they cried, which amounted to 7–8 times per day.[12]

From both the quantitative and qualitative findings, breastfeeding mothers are faced with personal and social constraints in practicing exclusive breastfeeding. Specific constraints identified include maternal health, breast and nipple problems, perceived milk insufficiency, and pressure from significant others. These findings support the findings of Otoo, Lartey and Perez-Escamilla on perceived incentives and barriers to exclusive breastfeeding among peri-urban Ghanaian Women.[17] In Bangladesh the biggest gaps were found in putting the baby to the breast within the first hour of birth (76% gap), feeding colostrum and not giving other fluids, foods or substances within the first three days (54% gap), and exclusive breastfeeding from birth through 180 days (90% gap).[18] This finding supports Grassley and Eschiti's position that grandmothers' own infant feeding experience and knowledge can influence mothers' decisions to initiate and continue breastfeeding or not.[19] In Uchendu, Ikefuna and Emodi's study which was conducted among breastfeeding mothers at the University of Nigeria Teaching hospital, 52% of women who had never practiced exclusive breastfeeding reported family opposition, especially grandmothers, and personal decision-making as major constraints.[20]

In the present study. Only 34% mothers received counseling about breast feeding and its importance. Women those who received advices regarding the importance of breast feeding before delivery and during hospital stay have initiated the breast milk to their newborns much early than those who do not received the advices from the health workers.[21] While counseling and proper education on desirable breastfeeding practices could be adopted to achieve a change in attitudes, perceptions, knowledge and practice of exclusive breastfeeding, the inadequate quality support from health care providers, as illustrated by the experiences of the nurses, could be a challenge. However, this is not peculiar to the provision of educational support on breastfeeding. Inadequate supply of health professionals and increasing health challenges is the bane of modern health delivery in developing nations.[22]

Initiation and continuation of breastfeeding is influenced by a complex interplay of culture, social support, and socioeconomic status.[23] Cultural beliefs and local traditions are important in determining health behavior in general. The erosion in the value of breastfeeding, lack of accurate and unbiased information on optimum infant feeding practices, and inadequate support to breastfeeding mothers are some of the factors responsible for poor rates of infant feeding practices.[24]

Health professionals have traditionally encouraged women to breastfeed their babies, by giving information about its benefits, calling it "promotion". However, there are many other critical factors that affect breastfeeding practices, such as hormonal control of breastfeeding, mothers' state of mind, perceptions of not having enough breast milk, dominant societal and media representations of breastfeeding, and being able to breastfeed in public. All these difficult situations require special skills and support, which currently is lacking.[6] Studies have shown that women who receive encouragement to breastfeed from health care providers are more likely to initiate and maintain breastfeeding than women who did not receive encouragement. Studies have also shown the influence of industry on health workers in undermining breastfeeding.[25]

Conclusion

Many maternal and child health workers invariably lack necessary knowledge and skills to help and support women initiate breastfeeding as well as support maintenance of exclusive breastfeeding. They also may believe that they know enough, creating a barrier in promoting breastfeeding. Health care providers can have a significant impact

on the intention to breastfeed, initiation, and consequent duration of breastfeeding. Hence, awareness and education is required towards benefits of breast feeding. Education related to breast feeding is required at antenatal and post natal period.

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Role of Nutrition and Dietetics in Palliative Cancer Care: A Special Perspective

Kumar Senthil P.*, Prasad Krishna, Shenoy Kamalaksha***, Rao Manisha******

Abstract

This article is aimed to provide a descriptive overview on nutritional and dietetic evaluation and intervention in palliative cancer patients, for whom appropriate identification, initiation and implementation of nutritional strategies are warranted to prevent complications secondary to anorexia and cachexia. Growing evidence from evaluation studies on diet and nutrition in palliative cancer patients suggested routine use of home parenteral nutrition, a thorough routine measurement of nutritional status was indicated to appropriately identify anorexia and cachexia, usefulness of Mini nutritional assessment score for bedside screening, and an inter-relationship between energy density and energy intake. Evidence from studies on nutritional interventions point out therapeutic benefits of involving family and caregivers into decision-making, better nutritional status resulted in lesser prevalence of complications, and European association for palliative care recommended a three-step approach to providing artificial nutrition and hydration in palliative cancer patients which deserve individualized application along a multidisciplinary biopsychosocial model.

Keywords: Palliative dietetics; Palliative nutrition; Dietetic oncology; Nutritional oncology.

This article is aimed to provide a descriptive overview on nutritional and dietetic evaluation and intervention in palliative cancer patients, for whom appropriate identification, initiation and implementation of nutritional strategies are warranted to prevent complications secondary to anorexia and cachexia.

Bovio *et al* studied anthropometric measurements, food and nutritional intake, and plasma levels of few serum proteins in 144 patients and calculated the basal metabolic rate (BMR). Low BMI, weight loss, lesser arm muscle area (AMA), lesser arm fat area (AFA) lesser daily calorie intake below the BMR in more females than in males, with subnormal plasma levels of prealbumin, transferrin, and albumin were found in both sexes.[1]

Fouladiun *et al* evaluated time course changes in body composition (dual-energy X-ray absorptiometry) with measurements of whole body and regional distribution of fat and lean tissue and its relationship to food and dietary intake, host metabolism (indirect calorimetry), maximum exercise capacity (walking test), and circulating hormones in 311 cancer patients who were receiving palliative care during 4-62 months of follow-up. "The study results demonstrated that body fat was lost more rapidly than lean tissue in progressive cancer cachexia, a phenomenon that was related highly to alterations in the levels of circulating classic hormones and food intake, including both caloric amount and diet composition."[2]

Holder explained that nursing professionals can combat the threat of cancer cachexia through methods that include nursing comfort strategies, the use of recommended pharmacological agents and dietary interventions such as experimenting with

Author's affiliation: *Professor, Maharishi Markandeshwar Institute of Rehabilitation (Maharishi Markandeshwar University), Mullana-Amabala, Haryana, **Consultant in Medical Oncology & Associate Professor, Dept. of Medicine, ***Professor & Head, Dept. of Radiation Oncology, Kasturba Medical college (Manipal University), Mangalore, Karnataka, ****Dietician, Kasturba Medical COlle & Hospital, Attavar, Mangalore, Karnataka, India.

Corresponding Author: Senthil P. Kumar, Professor, Maharishi Markandeshwar Institute of Physiotherapy and, Rehabilitation (Maharishi Markandeshwar University), Mullana-Ambala, Haryana, India.

E-mail: senthilparamasivamkumar@gmail.com

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different foods, textures, portion sizes and nutritional supplements (fish oil-enhanced nutritional supplements and artificial nutritional support).[3]

Kwang and Kandiah evaluated the nutritional status (anthropometric measurements, weight loss at 1/6 months, and the scored patient-generated subjective global assessment (PG-SGA)) of patients with cancer in palliative care and examined the interrelationship between objective and subjective nutritional assessment measures. Moderate-to-severe malnutrition was common, with nutritional symptoms of pain, xerostomia, and anorexia. PG-SGA scores were correlated well with anthropometric measurements.[3]

Orrevall *et al* conducted a national survey to investigate the prevalence, indications for, and perceived benefit of enteral/parenteral nutrition and intravenous glucose in 32 palliative care units throughout Sweden, representing 1083 patients with gastrointestinal and gynecological malignancies. The survey had following findings; "Thirteen percent of the patients received enteral/parenteral nutrition or intravenous glucose. Parenteral nutrition (PN) was significantly more common in home care units serving the urban Stockholm region (11%) than in other parts of the country (4%). Weight and appetite loss were the predominant indications for PN, with this treatment deemed beneficial for 75% of the palliative patients."[5]

Orrevall *et al* investigated patients' views and experiences of using home artificial nutrition, and factors associated with use of home parenteral nutrition (HPN) using structured telephone interviews with 620 cancer patients enrolled in 21 palliative home care services. The study had important findings; "HPN was more common than home enteral tube feeding. Home artificial nutrition was usually introduced more than four months before death. Three of four HPN recipients also had oral food intake. HPN use was associated with eating difficulties, nausea/vomiting, and fatigue rather than gastrointestinal problems per se. HETF was generally used for patients with problems related to oesophagus and head and neck tumours."[6]

Orrevall *et al* investigated the nutritional risk status and use of nutritional support among 621 cancer patients enrolled in 21 palliative home care services, and the differences in the use of nutritional support in relation to nutritional, social and clinical factors, as well as survival rates. The study found the following; "Nutritional support was used by 55% of the patients, with oral nutritional supplements most common and 14% using artificial nutrition. Use of nutritional support was related to low BMI and severe weight loss and was more common in patients with shorter survival times."[7]

Slaviero *et al* investigated the use of assessment tools applied to the routine clinical evaluation of nutritional status in patients with advanced solid malignancies before treatment with palliative chemotherapy by investigating the interrelationships between biochemical indices, anthropometric measures, and a nutritional screening tool, the Mini-Nutritional Assessment, in 73 patients. The baseline history of weight loss in these patients was found to be strongly correlated to the Mini-Nutritional Assessment (MNA) score, and to serum C-reactive protein (a marker of acute-phase response).[8]

Wallengren *et al* calculated energy balance from the change in body energy content by repeated dual-energy X-ray scans in 107 patients and investigated relationships between diet energy density (kcal/g), energy intake (kcal/day) and energy balance with systemic inflammation and survival as influencing factors. The energy density of solid food and energy intake were found to be positive predictors of energy balance which was positively associated with survival and negatively with systemic inflammation.[9]

Wallengren *et al* studied the relationship between ED (kcal/g) and EI (kcal/kg body weight per day), through dietary intake obtained from 251 food records (995 days) in a group of unselected palliative care cancer

patients. Age, BMI, fatigue, survival, and hypermetabolism were found to be associated with EI, but did not substantially influence the association between ED and EI in palliative care cancer patients.[10]

Wallengren *et al* studied energy density and energy intake in a group of palliative cancer patients and explored which method of energy density calculation yielded the highest determination coefficient of energy intake from 259 food records using four methods, differing in the types of food and beverages included in the analysis. The authors found a positive association between diet energy density and energy intake. The method used when calculating energy density had limited impact on this association. The authors also suggested that when calculating energy density all food and beverages should be included in the analysis.[11]

Growing evidence from evaluation studies on diet and nutrition in palliative cancer patients suggested routine use of home parenteral nutrition, a thorough routine measurement of nutritional status was indicated to appropriately identify anorexia and cachexia, usefulness of Mini nutritional assessment score for bedside screening, and an inter-relationship between energy density and energy intake.

Treatment

Amano *et al* studied the role of nutritional support on 63 terminally ill patients with cancer in a palliative care unit through a retrospective chart review of those patients who received individualized nutritional support (NS) and were compared to the others. Lower prevalence of pressure sores, edema, antibiotics use were noted in those patients who received NS.[12]

Prevost and Grach conducted a literature search of PubMed to review methods of measuring QoL, and modalities of nutritional intervention and their influence on QoL of cancer patients in palliative care. The authors gave following recommendations; "Nutritional status should be assessed early and regularly during treatment using appropriate tools. In the particularly acute context of palliative care, optimal patient management requires adequate education and counseling to patients and families. Meaningful interactions between the patient, caregivers and medical team would also increase the chance of resolving nutrition-related issues and help to fulfil each patient's specific nutritional needs and thus improve the QoL."[13]

European Association for Palliative Care (EAPC) Guidelines

Bozzetti *et al* proposed a three-step process for artificial nutrition and hydration: "Step 1: define the eight key elements necessary to reach a decision; Step II: make the decision; and Step III: reevaluate the patient and the proposed treatment at specified intervals. Step I involves assessing the patient concerning the following: 1) oncological/clinical condition; 2) symptoms; 3) expected length of survival; 4) hydration and nutritional status; 5) spontaneous or voluntary nutrient intake; 6) psychological profile; 7) gut function and potential route of administration; and 8) need for special services based on type of nutritional support prescribed. Step II involves the overall assessment of pros and cons, based on information determined in Step I, in order to reach an appropriate decision based on a well-defined end point (i.e., improvement of quality of life; maintaining patient survival; attaining rehydration). Step III involves the periodic reevaluation of the decision made in Step II based on the proposed goal and the attained result."[14]

Evidence from studies on nutritional interventions point out therapeutic benefits of involving family and caregivers into decision-making, better nutritional status resulted in lesser prevalence of complications, and European association for palliative care recommended a three-step approach to providing artificial nutrition and hydration in palliative cancer patients which deserve individualized application along a

multidisciplinary biopsychosocial model.

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Include summary of key findings (primary outcome measures, secondary outcome measures, results as they relate to a prior hypothesis); Strengths and limitations of the study (study question, study design, data collection, analysis and interpretation); Interpretation and implications in the context of the totality of evidence (is there a systematic review to refer to, if not, could one be reasonably done here and now?, what this study adds to the available evidence, effects on patient care and health policy, possible mechanisms); Controversies raised by this study; and Future research directions (for this particular research collaboration, underlying mechanisms, clinical research). Do not repeat in detail data or other material given in the Introduction or the Results section.

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Standard journal article

[1] Flink H, Tegelberg Å, Thörn M, Lagerlöf F. Effect of oral iron supplementation on unstimulated salivary flow rate: A randomized, double-blind, placebo-controlled trial. J Oral Pathol Med 2006;35:540-7.

[2] Twetman S, Axelsson S, Dahlgren H, Holm AK, Källestål C, Lagerlöf F, et al. Caries-preventive effect of fluoride toothpaste: A systematic review. Acta Odontol Scand 2003;61:347-55.

Article in supplement or special issue

[3] Fleischer W, Reimer K. Povidone iodine antisepsis. State of the art. Dermatology 1997;195 Suppl 2:3-9.

Corporate (collective) author

[4] American Academy of Periodontology. Sonic and ultrasonic scalers in periodontics. J Periodontol 2000;71:1792-801.

Unpublished article

[5] Garoushi S, Lassila LV, Tezvergil A, Vallittu PK. Static and fatigue compression test for particulate filler composite resin with fiber-reinforced composite substructure. Dent Mater 2006.

Personal author(s)

[6] Hosmer D, Lemeshow S. Applied logistic regression, 2nd edn. New York: Wiley-Interscience; 2000.

Chapter in book

[7] Nauntofte B, Tenovuo J, Lagerlöf F. Secretion and composition of saliva. In: Fejerskov O, Kidd EAM, editors. Dental caries: The disease and its clinical management. Oxford: Blackwell Munksgaard; 2003. p. 7-27.

No author given

[8] World Health Organization. Oral health surveys - basic methods, 4th edn. Geneva: World Health Organization; 1997.

Reference from electronic media

[9] National Statistics Online—Trends in suicide by method in England and Wales, 1979-2001. www.statistics.gov.uk/downloads/theme_health/HSQ 20.pdf (accessed Jan 24, 2005): 7-18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

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