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Original Article

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Nutrient Adequacy of Adult Males Belonging to Rural Areas of Ludhiana District (Punjab)

Singla Neerja*, Sadana Balwinder, Singla Priya*****

Abstract

A total of 147 rural adult males from two villages of Ludhiana district, Punjab belonging to low (LIG), medium (MIG) and high income groups (HIG) were surveyed for their nutrient adequacy. The daily intake of cereals, pulses, green leafy vegetables, roots and tubers, other vegetables, fruits, sugars and fats and oils was less than suggested intake, while that of milk and milk products was higher. Diets of the individuals were deficient in energy, â-carotene, riboflavin, niacin and vitamin B_{12} but contained higher amount of thiamine and calcium compared to ICMR's recommendation. Intake of protein, fat, folic acid and iron was higher in MIG and HIG than RDA as compared to LIG. Income significantly ($P<0.05$) affected fat, â-carotene, folic acid, calcium and iron consumption, whereas energy, protein, carbohydrate, thiamine, riboflavin, ascorbic acid intake of individuals was significantly ($P<0.05$) more in HIG as compared to LIG.

Keywords: Adult Males; Income Groups; Nutrient Adequacy**.**

Introduction

India, especially the state of Punjab, is also passing through a transitional phase of socio-economic development which has the potential of altering the nutritional status of population groups [13]. Majority (70%) of people lives in rural areas and depends directly or indirectly on agriculture for their living. Usually, there are limited number of markets and less diversity and availability of food items in rural areas that affect food security of rural households. Low and stagnating incomes among the poor lead to low purchasing power which remains a serious constraint to household food and nutritional security, even if food production picks up as a result of interventions in agriculture and creation of rural infrastructure [2].

Punjab being a rich state of India should be at an advantage of higher food intake by individuals. The green revolution in Punjab has improved the economic status of farming families. Males in Indian society are thought to be an advantageous group. Males being earning members of the family are given special share during food distribution. Surveys conducted by National Nutrition monitoring Bureau do not include the data for the state of Punjab. Hence, the present survey was carried to find nutrient adequacy of adult males belonging to various socio-economic groups in rural areas of Ludhiana district of Punjab.

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Materials and Methods

Two villages namely Bharonwal Kalan and Bhatha Dhua of central plain zone of Punjab in Ludhiana district were selected for the present investigation. Before collecting actual data, ten families were pre-surveyed, which were excluded from a total of 90 families which were selected randomly. Based on various social and economic factors, the screening of families was done in three categories with a mean socio economic scores of d" 30 (low-), 31-50 (middle) and e" 50 (high), respectively. The social scores comprised of caste, family structure, family education and organizational membership, whereas economic scores included farm and household assets, ownership of media, transport, electricity, household items and distinctive features.

All the adult males above 18 years of age were surveyed for their food intake. The data regarding food intake was recorded during the months of June-

August using 24 hour recall method for 3 consecutive days using standardized containers. The dietary nutrient intake was calculated from food intake using Dietcal software given by [8]. The average nutrient intakes were compared with recommended dietary allowances (RDA) for Indians [6] and per cent adequacy of various foods and nutrients were calculated. Mean and standard deviation for various parameters were computed. Analysis of variance was applied to assess the difference in food and nutrient intake of rural adult males belonging to three income groups i.e. low (LIG), middle (MIG) and high (HIG) income groups.

Food Intake

The data in Table 1 shows the food intake of the subjects of LIG, MIG and HIG. Main cereal consumed was wheat and maize as *chapattis.* The intake of cereals in three income groups ranged between 150-515, 177-475 and 133-540 g/d with the mean values of 288, 334 and 300 g/d, respectively. The cereal intake of MIG was significantly ($p < 0.05$) higher than LIG and HIG. The cereal intake was inadequate in all groups, the percent adequacy being 64, 74 and 67 per cent among LIG, MIG and HIG, respectively. Intake of pulses and legumes in three income groups ranged between 5-72, 0-123 and 0-150 g with the mean values of 27, 49 and 65 g/d respectively. The percent adequacy of pulses and legumes in three income groups was 30, 54 and 72 per cent, respectively indicating a statistically significant ($P<0.05$) difference among the three income groups. However, the intake of cereals and pulses in all the income groups were below than the suggested intake of 450 an 90 g, respectively [7].

The mean daily consumption of green leafy vegetables in three income groups was 0.3, 26 and 83 g, respectively indicating a severe inadequate intake of green leafy vegetables. The intake of roots and tubers by the subjects in three income groups ranged between 10-63, 17-158 and 20-168 g with the mean values of 35, 46 and 59 g, respectively with the per cent adequacy of 17, 23 and 29. The intake of leafy vegetables and roots and tubers increased with income and the consumption was statistically significant ($P<0.05$) different in all the three income groups. The mean daily intake of other vegetables by the subjects was 79, 74 and 58 g in LIG, MIG and HIG, respectively, the per cent adequacy being 39, 37 and 29 per cent. A non- significant difference regarding consumption of other vegetables was observed among the three income groups. The mean daily intake of fruits by LIG, MIG and HIG adult males was 12, 18 and 18 g, respectively. Consumption of all vegetables and fruits was found to be inadequate in the target population of three income groups when compared to suggested intake [7]. However, statistically significant ($P<0.05$) difference was found in LIG vs MIG and LIG vs HIG among the intake of fruits. Diet was grossly inadequate in roots and tubers, other vegetables and fruits which were similar to present study [12]. Lower intake of all the vegetables among males of Northern Sweden was compared to the present study [11].

The daily consumption of milk and milk products in three income groups ranged between 116-850, 150-1117 and 400-1300 g with the mean values of 314, 601 and 876 g and with percent adequacy of 105, 200 and 292 per cent, respectively. The consumption of milk products significantly ($P<0.05$) increased with an increase in income. Average milk consumption by all individuals in all groups was significantly higher than ICMR's suggested intake. Similar findings were reported [5]. Contradiction to the present study, the intake of milk was less among lower income group [14].

The sugar consumption was found to be highest among HIG (21g) followed by MIG (20 g) and LIG (11 g), the per cent adequacy being 38, 67 and 71 per cent, respectively. A statistically significant ($P<0.05$) difference was found in the sugar intake among LIG vs MIG and LIG vs HIG. A statistically significant ($P<0.05$) difference was found in fats and oils consumption among all the three income groups. The mean consumption being was 9, 18 and 22 g with a per cent adequacy being was 29, 60 and 72 %, respectively.

The mean daily intake of cereals, pulses, green leafy vegetables, root and tubers, other vegetables, fruits, milk and milk products, fats and oils and sugars was 332.0, 40.5, 34.4, 93.7, 193.6, 107.3, 573.2, 27.9 and 24.7 g, among rural males of Punjab, India respectively [1].

Table 1: Average daily food intake (g) of the subjects (Mean±SE)

Food groups	LIG (n=44)	MIG (n=46)	HIG (n=57)	Suggested intake*
Cereals	288^{c} ±11.2	334^{a} ±12.2	300^{bc} ±13.0	450
Pulses and legumes	27^{c} ±2.6	49^{b} ±4.0	65^{a} ±5.2	90
Leafy vegetables	0.3^{c} ±0.3	26^{b} ±7.0	83^{a} ±11.0	100
Roots and tubers	35^{c} ±2.3	46^{b} ±3.7	59^{a} ±4.3	200
Other vegetables	79^{a} ±9.6	74^{a} ±13.1	58^{a} ±6.2	200
Fruits	12^{b} ±2.4	18^{a} ±1.5	18^{a} ±1.7	100
Milk and milk products	314^{c} ±26.0	601^{b} ±41.0	876^{a} ±39.0	300
Sugars	11^{b} ±0.6	20^{a} ±1.2	21^{a} ±1.0	30
Fats and oils	9^{c} ±0.6	18^{b} ±1.3	22^{a} ±1.0	30

DMRT test has been applied
Figures followed with different superscripts are significantly different (P<0.05) *[7]

Table 2: Per cent adequacy of food intake of the subjects

Food groups	LIG (n=44)	MIG (n=46)	HIG (n=57)
Cereals (g)	64.0	74.0	67.0
Pulses and legumes (g)	30.0	54.0	72.0
Leafy vegetables (g)	0.3	26.0	83.0
Roots and tubers (g)	17.0	23.0	29.0
Other vegetables (g)	39.0	37.0	29.0
Fruits (g)	12.0	18.0	18.0
Milk and milk products (g)	105.0	200.0	292.0
Sugars (g)	38.0	67.0	71.0
Fats and oils (g)	29.0	60.0	72.0

Nutrient Intake

The data regarding daily nutrient intake of the subjects has been presented in Table 3. A statistically significant (P<0.05) difference was observed in daily energy and protein consumption among the males of LIG, MIG and HIG. All the groups had lower energy intake than the recommended dietary allowances, the per cent adequacy being 55, 74 and 76 in LIG, MIG and HIG, respectively. The per cent adequacy of protein intake was slightly lower (89) among men belonging to LIG, whereas it was higher in men belonging to MIG and HIG (129 and 134 respectively). Average daily consumption of fat was 29 g with an adequacy of 95 per cent among the men of LIG families. However, the values were quite high being 53 and 59 g with a per cent adequacy of 176 and 198 among men belonging to MIG and HIG, respectively. A statistically non-significant difference was observed in carbohydrate intake among the subjects of MIG and HIG, whereas the difference was significant when intake by men of LIG was compared to MIG and HIG. Mean energy intakes of male respectively were 1916.0 ± 368.5 k cals. 50.3 ± 8.2 g protein, 32.4 ± 6.0 g fat which was comparable to the subjects of LIG in present study [10].

A highly significant lower intake of â-carotene was observed in LIG, MIG and HIG men, the values being 103, 863 and 2008 µg, respectively against the ICMR recommendations of 4800 mcg [6]. It might be due to a significantly lower intake of leafy vegetables and fruits among all the three income groups. The intake of thiamine among the subjects of all the income groups was higher and that of riboflavin and niacin was lower as compared to RDA [6]. The higher intake of thiamine might be due to the reason that consumption of whole grain cereals and unrefined flour was more than 50% among families, the adequacy being 121, 143 and 143 per cent in LIG, MIG and HIG, respectively (Table 4). The average daily intake of Vitamin B_{12} was found to be less among all the three income groups as compared to RDA's of 1.0 µg [6], the values being 0.3, 0.6 and 0.7 µg among LIG, MIG and HIG, respectively which might be due to non inclusion of non-vegetarian foods in their daily diets. The data revealed that the mean daily intake of folic acid in LIG was 160 µg which was less than recommendations of 200 µg [6]. It might be due to inadequate intake of whole grain cereals, pulses, green leafy vegetables and roots & tubers among men belonging to LIG, whereas the intake was found to be higher than RDA's among MIG and HIG men (210

and 260, respectively). The data regarding mean daily intake of vitamin C (Table 3) by the subjects of all the three income groups revealed that intake increased with an increase in the income. The values are 27, 33 and 57 mg in LIG, MIG and HIG men, respectively. When compared to RDA's (40 mg), the intake was found to be inadequate among LIG and MIG; which might be due to inadequate intake of citrus fruits and green leafy vegetables but intake was higher among men of HIG families. The per cent adequacy in three income groups was 67, 82 and 144 per cent, respectively. A statistically significant ($P<0.05$) difference in consumption of ascorbic acid, vitamin B_{12} and folic acid was observed in all the three income groups. The deficient intake of fruits and vegetables among men resulted in deficient intake of B-carotene, ascorbic acid and folic acid [9].

Due to significantly lower intake of green leafy vegetables, very low intake of iron was observed among men belonging to LIG (7 mg) and MIG (12 mg) when compared to recommended value of 17 mg per day [6], whereas an intake of 17 mg was observed among the men of HIG which was comparable to the recommended intake. The per cent adequacies are 39, 71 and 101, respectively (Table 4) among the three income groups**.** A statistically significant ($P<0.05$) difference was observed regarding the consumption of calcium among men in all the three income groups. The mean calcium intake was found to be adequate in LIG (600 mg), whereas intake was higher among MIG (1081 mg) and HIG (1278 mg) as compared to recommended intake of 600 mg [6]. The per cent adequacy of calcium in LIG, MIG and HIG men was 100, 180 and 213, respectively.

Similar to present findings, the average daily intake of energy, niacin and iron was inadequate while protein, riboflavin and calcium intake was adequate among men of rural areas of Punjab [1]. More than half of the participants did not meet RDA's for energy, vitamin C, thiamine, riboflavin and calcium [4].

Table 3: Average daily nutrient intake of the subjects (Mean±SE)

Food groups	LIG (n=44)	MIG (n=46)	HIG (n=57)	RDA*
Energy (Kcal)	1430^{b} ±50.2	2013^{a} ±57.6	2082^{a} ±59.4	2730
Protein (g)	54^{b} ±2.0	77^{a} ±2.1	81^{a} ±2.0	60
Fats (g)	29^{c} ±1.1	53^{b} ±2.2	59^{a} ±1.4	30
Carbohydrates (g)	239^{b} ±9.0	307^{a} ±9.0	306^{a} ±10.0	-
B-carotene (µg)	103^{c} ±31.6	863^{b} ±170.3	2008^{a} ±286.0	4800
Thiamine (mg)	1.7^{b} ±0.1	2.0^{a} ±0.1	2.0^{a} ±0.1	1.4
Folic acid (µg)	160^{c} ±6.1	210^{b} ±8.1	260^{a} ±12.2	200
Vitamin B_{12} (µg)	0.3^{c} ±0.02	0.6^{b} ±0.03	0.7^{a} ±0.03	1.0
Ascorbic acid (mg)	27.0^{b} ±4.3	33^{b} ±3.5	57^{a} ±4.4	40
Iron (mg)	7^{c} ±0.6	12^{b} ±1.0	17^{a} ±1.0	17
Calcium (mg)	600.0^{c} ±29.0	1081^{b} ±57.4	1278^{a} ±39.4	600

DMRT test has been applied
Figures followed with different superscripts are significantly different ($P<0.05$) *[6]

Table 4: Per cent adequacy of nutrient intake of the subjects

Food groups	LIG (n=44)	MIG (n=46)	HIG (n=57)
Energy (Kcal)	55.0	74.0	76.0
Protein (g)	89.0	129.0	134.0
Fats (g)	95.0	176.0	198.0
B-carotene (µg)	2.0	18.0	42.0
Thiamine (mg)	121.0	143.0	143.0
Folic acid (µg)	80.0	105.0	130.0
Vitamin B_{12} (µg)	30.0	60.0	70.0
Ascorbic acid (mg)	67.0	82.0	144.0
Iron (mg)	39.0	71.0	101.0
Calcium (mg)	100.0	180.0	213.0

Per cent contribution to total energy intake

The data regarding per cent contribution of energy by various nutrients has been presented in Table 5. Carbohydrate contributed 67, 61 and 59 per cent of total energy intake in the subjects of LIG and MIG men and HIG, respectively, which was within the range of 65-70 per cent as given by ICMR indicating that as the income increased, the per cent contribution to total energy intake by the carbohydrate decreased. However, no difference was observed regarding per cent contribution of protein to total energy intake. An increase in income resulted in the increase in per cent contribution of energy from fat. Percent contribution of fats to total daily energy was 32.5%, which was undesirable and higher as compared to present study [1]. Total fat intake (74 g/day) by urban men of Ludhiana District was significantly more than that of men in rural areas [3].

Table 5: Per cent contribution of carbohydrates, protein and fats to the total energy intake

Nutrient	LIG (n=44)	MIG (n=46)	HIG (n=57)
Carbohydrate	67.0	61.0	59.0
Protein	15.0	15.4	15.5
Total fat	18.0	24.0	26.0

Conclusion

It was concluded from the present study that diet consumed by male subjects was higher in milk and milk products and was inadequate in cereals, pulses, leafy vegetables, roots and tubers, other vegetables, fruits, sugars and fats and oils. However, intake of green leafy vegetables, fruits and other vegetables was inadequate leading to deficiency of vitamins and minerals like iron and vitamin B_{12}. So there is an urgent need to educate about the importance of balanced diet and promote the consumption of foods like cereals, pulses, green leafy vegetables, roots and tubers, sugar and fruits etc. in their diet to improve their nutritional status.

References

1. Bains K and Kaur J. Food and nutrient intake in relation to cardiovascular disease among rural males of Punjab, India. *Asia Pacific J Clinic Nutr*. 2004; 13: 95.
2. Bashir MK, Schilizzi S and Pandit R. *The Determinants of rural household food security for landless household of the Punjab, Pakistan*, Working paper 1208, School of Agricultural and Resource Economics, University of Western Australia, Crawley, Australia. 2012.
3. Choudhary M, Grover K and Javed M. Nutritional profiles of urban and rural men of Punjab with regard to dietary fat intake. *Ecol Food Nutr*. 2014; 53:436-52.
4. Gan WY, Mohd NMT, Zalilah MS and Hazizi AS. Difference in eating behaviours, dietary intake and body weight status between male and female Malaysian Unicersity Students. *Mal J Nutr.* 2011; 17**:** 213-28.
5. Gupta N, Shah P, Goel K, Misra A, Rastogi K, Vikram NK, Kumari V, Pandey RM, Kondal D, Wasir JS, Bhardwaj S and Gulati S. Imbalanced dietary profile, anthropometry and lipids in urban Asian Indian adolescents and young adults. *J American College Nutr*. 2010; 29**:** 81-91.
6. ICMR. *Nutrient Requirements and Recommended Dietary Allowances for Indians,* National Institute of Nutrition, Indian Council of Medical Research, Hyderabad, India. 2010a.
7. ICMR. *Dietary guidelines for Indians*. A manual of National Institute of Nutrition, Hyderabad, India. 2010b.
8. Kaur G. Diet Cal Software-a tool for dietary assessment and planning. All India Institute of Medical Sciences, New Delhi. 2014.
9. Manthanghi SK, Hemalatha G, Amutha S and Arulmozhiselvan S. Impact of fruit and vegetable intake by healthy subjects on the risk factors of cardiovascular diseases. *The Indian J Nutr Dietet*. 2015; 52**:** 23-35.
10. Prabhat A and Begum K. Nutrient intake and anthropometric profile of healthy adult men and women couples from selected households in west sea coast belt of south Karnataka-A comparative study. *J Nutr Food Sci.* 2014; 4**:** 279.
11. Ross AB, Johansson A, Vavruch NV, Hassler S, Sjolander P, Edin LA and Gyllensten U. Adherence to a traditional lifestyle effects food and nutrient intake among modern Swedish sami. *Int J Circumpolar Health.* 2009; 68**:** 372-85.

12. Sachdeva R, Grewal S and Kochhar A. Efficacy of nutrition counseling on nutritional and haematological profile of elderly males of urban and rural areas. *J Hum Eco.* 2006; 20**:** 37-41.

13. Sidhu S and Kumari K. Incidence of overweight and obesity among urban and rural males of Amritsar. *J Exercise Sci. Physiotherapy*. 2006; 2**:**79-83.

14. Singh J and Vatta K. Rise in food prices and changing consumption pattern in rural Punjab. *Curr Sci*. 2013; 104**:** 1022-27.

Original Article

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Impact of Nutrition Education on Hemoglobin Levels of 6 to 18 Months Infants

Shivani Lodha*, Vandana Bharti**

Abstract

Iron deficiency anemia is the most common nutritional disorder, even in the current era. Adequate nutrition during infancy and early childhood is essential to ensure the growth, health, and development of children to their full potential. The objective of the study was to assess the impact of nutrition education on hemoglobin concentration of infants aged 6-18 months. *Material and Methods:* 300 mothers from Indore city participated in the study. Mothers were divided randomly in to experimental group (EG) and control group (CG). EG mothers received nutrition education at fixed interval whereas CG mothers did not receive any education. Pathological reports were considered for assessing hemoglobin levels and then grade of anemia was decided. *Results:* At baseline, the mean hemoglobin (Hb) level for EG and CG was observed to be 12.13±1.33gm% and 11.40±1.29gm% respectively. At Phase I, a significant drop in Hb concentration was observed in both EG and CG ($p<0.01$). Continuous nutrition education resulted in significant rise in HB levels in EG at Phase II as compared to CG ($p<0.01$). In CG, a significant increase in infants suffering from mild and moderate anemia was seen ($p<0.01$) whereas no change was observed in EG. *Conclusion:* There is a real need for parental education for sound and correct child rearing practices and, in particular, advice on how, when and why and with to feed the child. If nutrition could be improved at this age, there might be beneficial effects on growth and health of infants in the short run. Therefore, there is an urgent need to improve traditional complementary foods in terms of energy density and bioavailability of macro and micro nutrients.

Keywords: Hemoglobin; Anemia; Nutrition Education.

Introduction

Adequate nutrition during infancy and early childhood is essential to ensure the growth, health, and development of children to their full potential. Poor nutrition increases the risk of illness, and is responsible, directly or indirectly, for one third of the estimated 9.5 million deaths that occurred in 2006 in children less than 5 years of age. Inappropriate nutrition can also lead to childhood obesity which is an increasing public health problem in many countries [1, 2]. Ensuring optimal complementary feeding practices for young children living in developing countries is a global public health priority because of their overwhelming importance for optimal growth, development, and well-being of infants and young children [3].

Iron deficiency anemia is the most common nutritional disorder, even in the current era. Iron is essential for oxygen carrying, muscle functions, immune function and brain myelination, neurotransmission and cognitive functions. Even mild to moderate anemia in infancy and early childhood are known to leave a permanent signature on the growing brain. Iron has effects on the neurotransmitters like dopamine and probably serotonin. Iron deficiency reduces dopaminergic receptors and the reduction in dopaminergic receptors leads to increase in opiate receptors and resultant defective learning ability and cognition. The role of iron deficiency on aggravating breath holding spell, febrile seizure, and hyper-cyanotic blue spell are also being increasingly observed in clinical practice [4].

Rapid growth of infants during the first year of life requires an adequate supply of iron for synthesis of blood, muscle, and other tissues. Most health authorities recommend exclusive breastfeeding for 6 months, a practice thought to prevent development of iron deficiency anemia in term, healthy infants.

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However, if infants are exclusively breast-fed beyond that age, they are at increasing risk of developing iron deficiency anemia [5]. The paradox of nutritional problems is that they are preventable but still exist in such a large magnitude. This affects the socioeconomic development of the community and the country leads to social inequality and poverty. Also, most mother and health workers know very little of how much food a child needs for adequate growth and development. Hence, the advice given is inaccurate and often conflicting. Thus, the objective of the study was to evaluate the impact of nutrition education on the hemoglobin stats of the infants

Methodology

In the present study, 300 infants aged (6 months - 18 months) and their mothers (Middle Income group and High Income Group) from Indore city. Samples were selected according to inclusion and exclusion criteria set for the study. Premature babies, children with known anomalies, low birth weight babies, infants suffering from pneumonia, convulsions or any other metabolic disorder were some of the exclusion criteria followed for the study.

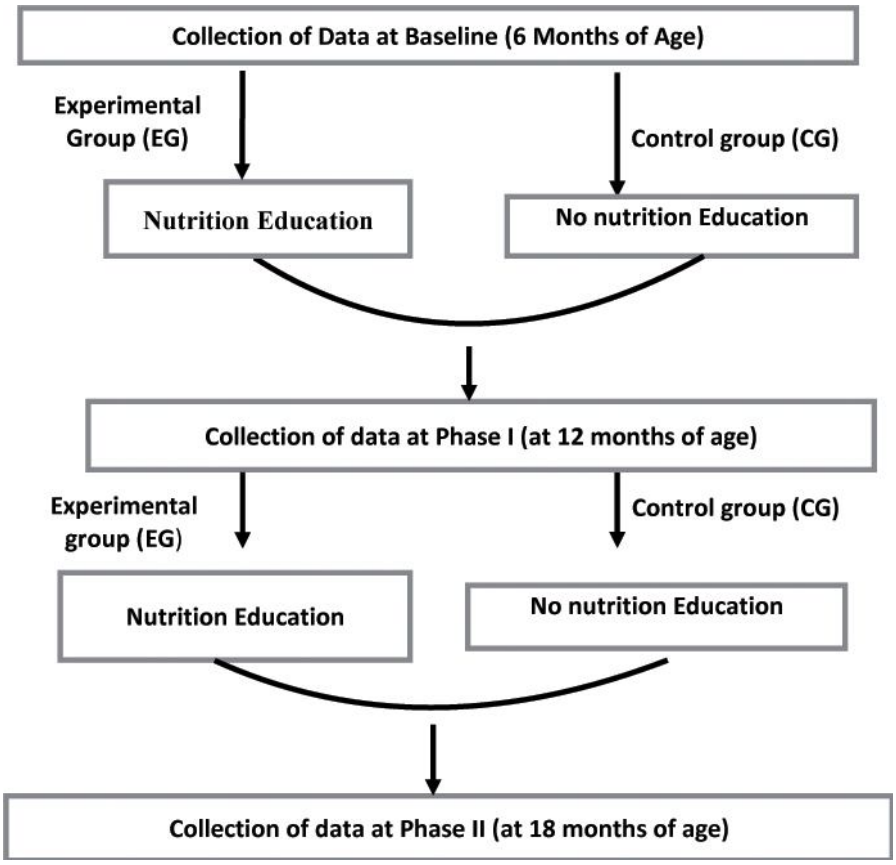
The mothers who got enrolled for the study with their consent were randomly assigned to control and experimental group. The mothers and their infants were grouped as follows:

Experimental group

This group (150 infants and their mothers) will be given nutrition education through counseling, and training through different communication skills like charts, demonstrations, leaflets, recipe booklets, diet charts.

Control group

This group (150 infants and their mothers) will not receive any nutrition education counseling, and training as this group is considered as control group for comparison in the study.



Baseline data was collected from the mothers when infants turned 6 months. Mothers were assessed (for both control and experimental group) and counseled (experimental group) at each immunization session at 9 months, 12 months, 15 months and at 18 months. Effect of nutrition education on Knowledge of mothers and complementary feeding practices was recorded at 12 months (Intervention Phase I) and at 18 months (Intervention Phase II).

For the purpose of data collection, socio demographic information was collected using semi structured questionnaire was used. For assessing the hemoglobin concentration in the blood, pathological test was conducted. The hemoglobin levels provided by the pathologists were considered authentic and were used to study the level of anemia in infants. The hemoglobin levels were assessed using Cyan Methemoglobin method by the pathologists. Hemoglobin assessment was done at Baseline, at Phase I and at Phase II.

After assessing the hemoglobin values, infants were categorized into following indices of grade of anemia.

Indicatives of anemia for 6 months to 6 years children

Indicators of anemia	Hemoglobin levels (gm %)
Non anemia/Normal	>11
Anemic	<11
Mild anemic	>10-10.9
Moderate anemia	>7-9.9
Severe anemia	>6.9

Ref: WHO technical Report series, No 405, 1968; and Nelson Textbook of Pediatrics, 17th Edition

A planned package of nutrition education was formulated keeping the obtained baseline information in mind as per the goal and objectives of the study. Nutrition education as an intervention was carried out only for experimental group for a period of one year at planned intervals. Nutrition education program comprised of sequential interactive sessions on various aspects of infant and young child feeding practices based on up to date scientific literature available as guidelines for infants. Majority of the subjects in the initial scrutiny were found not having proper feeding practices like type of food offered, consistency of feeds, meal frequency etc. To mitigate the gap in communication, the experimental group received interpersonal counseling. The progress towards achieving goals is the last and the most important part of the study. Understanding the attitude is the basis to putting a plan into action. Evaluation was made at each visit for the participant. The subjects were evaluated on nutrition education given in the previous sessions and were always motivated to place their queries, problems in front of the researcher, who tried to solve their problems in appropriate manner with proper scientific evidence.

Statistical analysis was done. The responses of frequencies of 300 subjects were calculated and analyzed by using the raw data. The raw data were entered into the computer database. Statistical software, SPSS version 21.0 was used for statistical analysis. MS Excel was used for graphical representation. Z-test was used to identify the significance of mean differences in hemoglobin concentration between baseline and post observations in experimental and control groups. Chi-square test was used to find the association between experiment and control group.

Results

In the present study, at baseline, the mean hemoglobin level for EG and CG was observed to be 12.13±1.33gm% and 11.40±1.29gm% respectively. After administration of nutrition education to the EG, a significant increase in hemoglobin concentration was observed at Phase I ($p<0.01$). At Phase I in CG the mean hemoglobin concentration was 10.25±1.45gm%. The drop in hemoglobin level was highly significant ($p<0.01$) with a mean difference of 1.45 between baseline and Phase I (Table 1). When compared the mean difference in hemoglobin concentration between experimental and control group, from baseline to Phase I, no significant change was observed between the two groups ($p>0.05$) (Table 2).

Table 1: Comparison in hemoglobin concentration between baseline and post nutrition education stage (phase 1) for experimental and control group

Group	Variable	Sampling Stage	Spread Mean ± SD		MD	Z-value	LOS
Exp	*Hemoglobin*	*Baseline*	12.13	1.335	0.96	**6.69**	p<0.01*
		Phase I	11.17	1.43			
Ctrl	*Hemoglobin*	*Baseline*	11.40	1.29	1.15	**9.29**	p<0.01*
		Phase I	10.25	1.45			

Table 2: Comparison in the mean difference of hemoglobin concentration between experimental and control group of baseline and phase I stage

Parameter	Experiment MD (A)	Control MD (B)	Difference (A-B)	Z Value	LOS
Hemoglobin	0.96	1.15	0.19	**1.02**	p>0.05

Table 3: Comparison in hemoglobin concentration between baseline and post nutrition education stage (Phase II) for experimental and control group

Group	Variable	Sampling Stage	Spread Mean ± SD		MD	Z-value	LOS
Exp	***Hemoglobin***	*Baseline*	12.13	1.335	0.47	**12.40**	p<0.01*
		Phase II	12.26	0.86			
Ctrl	***Hemoglobin***	*Baseline*	11.40	1.29	1.09	**7.22**	p<0.01*
		Phase II	10.31	1.33			

As see in Table 3, at Phase II, the mean hemoglobin of EG and CG was 12.26±0.86gm % and 10.31±.33gm% respectively. In the EG, delivering nutrition education showed a significant rise in hemoglobin concentration from baseline to Phase II (p<0.01). Contrary to experimental group, control group showed a significant decline in hemoglobin concentration at Phase II with a mean difference of 1.09 (p<0.01). The mean rise in hemoglobin concentration of EG after receiving nutrition education was highly significant as compared to the mean decrease in hemoglobin concentration in CG (p<0.01) (Table 4).

Table 4: Comparison in the mean difference of hemoglobin concentration between experimental and control group of baseline and phase II stage

Parameter	Experiment MD (A)	Control MD (B)	Difference (A-B)	Z Value	LOS
Hemoglobin	0.13	1.09	0.96	**4.52**	P<0.01*

Also there was a significant increase in hemoglobin concentration from Phase I (11.17±1.43gm %) to Phase II (12.26±0.86) in EG whereas no significant change was observed in CG (Table 5). As shown in Table 6, EG had higher increase in mean hemoglobin concentration as compared to mean increase in hemoglobin concentration of CG (p<0.01).

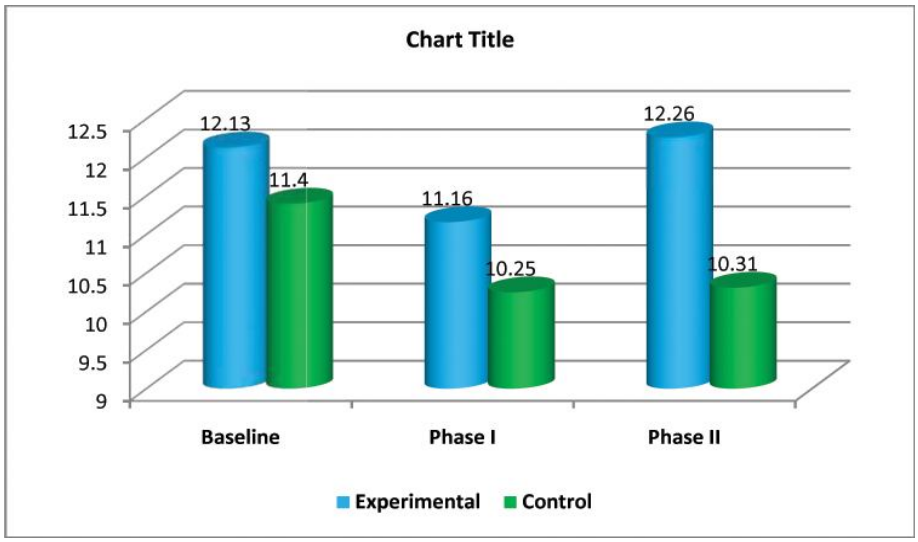
Table 5: Comparison in hemoglobin concentration between post nutrition education stages phase I and phase II for experimental and control groups

Group	Variable	Sampling Stage	Spread Mean ± SD		MD	Z-value	LOS
Exp	*Hemoglobin*	*Phase I*	11.17	1.43	1.09	**6.60**	p<0.01*
		Phase II	12.26	0.86			
Ctrl	*Hemoglobin*	*Phase I*	10.25	1.45	0.07	**1.04**	p>0.05
		Phase II	10.31	1.33			

Table 6: Comparison in the mean difference of hemoglobin concentration between experimental and control group of phase I and phase II stage

Parameter	Experiment MD (A)	Control MD (B)	Difference (A-B)	Z Value	LOS
Hemoglobin	1.09	0.06	1.03	**6.49**	P<0.01*

Fig. 1: Comparison in Hemoglobin Concentration between Baseline and Post Nutrition Education Stages (Phase I and Phase II) for Experimental and Control Groups



According to the hemoglobin levels of infants there were graded as normal, mild anemic and moderate anemic. At baseline, 82% and 12% infants from EG were normal and mildly anemic respectively. Post nutrition education, at Phase I, 70% infants were normal, 19% infants were mildly anemic and 11% infants were suffering from moderate anemia (p>0.05). At Phase II, continuous nutrition education resulted in non significant change in number of infants 71%, 15% and 14% infants were normal, mild and moderate anemic respectively (p>0.05).

In the CG, at baseline 77% infants were healthy and 18% infants were suffering from mild anemia. At Phase I, a significant decrease was observed in percentage of infants who were healthy (46%) and a significant increase was seen in mild anemic infants (33%) and moderate anemic (21%) infants (p<0.01). At Phase II, a highly significant increase in infants suffering from mild and moderate anemia was observed (25% and 27%) as compared to baseline data (p<0.01). No significant change (p>0.05) was observed between phase I and Phase II (Table 7).

Table 7: Percentage distribution of grades of anemia between baseline and post nutrition education stages in experimental and control group

Gr	Parameter	Sampling Stage	Spread		Moderate (%)	'p' value
			Normal (%)	Mild (%)		
Experimental	*Grade of anemia*	*Baseline*	82	12	6	**0.135**
		Phase I	70	19	11	
		Baseline	82	12	6	**0.115**
		Phase II	71	15	14	
		Phase I	70	19	11	**0.657**
		Phase II	71	15	14	
Control	*Grade of anemia*	*Baseline*	77	18	5	**0.000***
		Phase I	46	33	21	
		Baseline	77	18	5	**0.000***
		Phase II	48	25	27	
		Phase I	46	33	21	**0.387**
		Phase II	48	25	27	

Discussion

In the present study nutrition education had positive impact on hemoglobin concentrations in infants. Educating to the mother about various ways to increase iron content in the diet, its bio-availability and providing foods which are rich in energy and proteins showed improvement in the hemoglobin levels of the experimental group infants as compared to the control group.

If nutrition could be improved at this age, there might be beneficial effects on growth and health of infants in the short run. Therefore, there is an urgent need to improve traditional complementary foods in terms of energy density and bioavailability of macro and micro nutrients.

Children under 2 years of age have high nutrient needs to support growth and development, yet breast-fed infants typically consume relatively small amounts of foods other than breast milk. As a result, complementary foods need to be high in nutrient density, i.e., the amount of each nutrient per 100 kcal of food. Iron and zinc are generally the most problematic nutrients during the period of complementary feeding [6], largely because their concentrations in human milk are low relative to needs.

Growth faltering is prevalent in developing countries [7] in which children are susceptible to infection and malnutrition [8, 9]. Globally, an estimated 43% of children < 4 y old are anemic [10]. Children < 2 y old are particularly vulnerable due to their increased demand for nutrients as they transition from exclusive breast-feeding to consuming complementary foods [11]. A limited variety of complementary foods has been associated with low nutrient density adequacy of the foods, which may cause malnutrition and developmental delays [12].

According to WHO, meeting micronutrient needs from complementary foods appears to be the greatest challenge [13]. One possibility could be to modify currently consumed grains by germination to reduce the anti-nutritional factors, such as phytates and tannins that interfere with the bio availability of micronutrients. As in our country mostly children consume cereals as staple food, similar observation was observed in rural Tanzania where it was seen that dietary deficiency in iron might be among the major reason for iron deficiency at this age period because of the majority of infants and young children consumed cereal based complementary foods which are low in iron content and bioavailability is also poor [14].

Quite often, the foods suggested are commercial, expensive and beyond the reach of the major sections of the community. The elaborate recipes are time consuming, besides requiring additional resources. In addition there is heavy influence of advertisements through TV, radio, popular magazines, newspapers, internet etc. on commercial instant weaning foods, and other foods which are expensive and are not suitable for all age groups [15].

Understandable, there is a real need for parental education for sound and correct child rearing practices and, in particular, advice on how, when and why and with to feed the child from what it is easily available in the household, provided enough of it is given. Thus, improving knowledge, attitudes, skills and practices of families will become the key in improving child nutrition. Perhaps, in no other branch of medicine, parental education plays such a crucial role as it is on the nutrition education of the parents.

References

1. World Health Organization. *The global burden of disease: 2004 update*. Geneva, World Health Organization, 2008.
2. Black RE et al. Maternal and child under-nutrition: global and regional exposures and health consequences. *Lancet*, 2008; 371: 243–60.
3. WHO / UNICEF. Global strategy for infant and young child feeding, Geneva: World Health Organization; 2003.
4. KE Elizabeth, Iron and Zinc Deficiency in Children, INDIAN PEDIATRICS.2011; Volume 48: 741- 742.
5. Allen LH: Causes of nutrition-related public health problems of preschool children: available diet. J PediatrGastroenterolNutr 2006: 43(Suppl. 3): S8-12.
6. Vossenaar M, Solomons NW. The concept of "critical nutrient density" in complementary feeding: the demands on the "family foods" for the nutrient adequacy of young Guatemalan children with continued breastfeeding. Am J ClinNutr.2012; 95: 859–66.
7. Louise I Mennen, Ron Walker, Catherine Bennetau-Pelissero, and Augustin Scalbert. Risk and safety of polyphenol consumption. Am J ClinNutr2005; 81(suppl.): 326S–9S.
8. PF van Rheenen, LTT de Moor, S Eschbach2 and BJ Brabin A cohort study of hemoglobin and zinc protoporphyrin levels in term Zambian infants:

effects of iron stores at birth, complementary food and placental malaria European Journal of Clinical Nutrition.2008; 62: 1379–1387.

9. Bertenthal BI, Campos JJ. A systems approach to the organizing effect of self-produced locomotion during infancy. Adv Infancy Res.1990; 6: 1–60.
10. Emily H. Siegel, Rebecca J. Stoltzfus, Patricia K. Kariger, Joanne Katz, Subarna K. Khatry, Steven C. LeClerq,† Ernesto Pollitt, and James M. TielschGrowth Indices, Anemia, and Diet Independently Predict Motor Milestone Acquisition of Infants in South Central Nepal J. Nutr.2005; 135: 2840–2844.
11. Peter S. Mamiro, Patrick Kolsteren, Dominique Roberfroid, Simon Tatala3, Ann S. Opsomer1, and John H. Van Camp Feeding Practices and Factors Contributing to Wasting, Stunting, and Iron-deficiency Anaemia among 3-23-month Old Children in Kilosa District, Rural Tanzania J HEALTH POPUL NUTR 2005 Sep; 23(3): 222-230.
12. Mamiro PRS, Van Camp J, Mwikya SM, Huyghebaert A. In vitro extractability of calcium, iron and zinc in finger millet and kidney beans during processing. *J Food Sci*2001; 66: 1271-5.
13. Comprehensive implementation plan on maternal, infant and young child nutrition world health organization 2014. www.who/int/nutrition.
14. Peter S. Mamiro, Patrick Kolsteren, Dominique Roberfroid, Simon Tatala, Ann S. Opsomer, and John H. Van Camp Feeding Practices and Factors Contributing to Wasting, Stunting, and Iron-deficiency Anaemia among 3-23-month Old Children in Kilosa District, Rural Tanzania J HEALTH POPUL NUTR 2005 Sep; 23(3): 222-230.
15. SurajGupte. Textbook of pediatric nutrition 2006 Peepee Publications first edition New Delhi pg 495-499.

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Original Article

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A Study on Health Status of Female Employees Working in Call Centre

Shivani Sharma*, Vandana Bharti**

Abstract

The advancement in technologies and machineries which have made the living more easy, on the contrary have caused people to be less active and follow a sedentary lifestyle. Call centers have emerged as the most sought after workplace for Indian women in recent times. Due to intensive work pressure, requiring high levels of concentration, the performance of employees deteriorates, also performing one type of activity throughout the day. Long hours of work, permanent night shifts, incredibly high work targets, and health problems are major issues. 75% of women working in a call centers have direct effect on their health as working night shifts was upsetting their biological clock. In this study 300 call centre female employees were selected randomly for the purpose through medical assistance in the form of physical health check up camp arranged in the vicinity of call centre. The information related to their health was collected through a questionnaire and physical screening. Descriptive statistics such as mean, frequencies and % were used to describe the association of the variables. The study revealed that majority of females possess normal blood pressure (77.3%), the problem of vision was higher in number (50%) as compare to hearing and earache problem i.e.(32.3% & 17.7%). It was found that the prevalence of bone problems was also higher i.e. (82%) in females which included shoulder joint pain, wrist joint, and neck-back pain. The acidity rate was slightly higher i.e. 44% whereas constipation problem was not much common in females (29%). Majority of the respondents reported of occupational stress and lack of sleep respectively, (63% and 53.3%). Social health was also affected in fifty per cent of the females (51.3%) and irregularity of menstrual cycles also reported in maximum number of females (79.3%).

Keywords: Call centre; Health Problems.

Introduction

With the help of technology, activities are no longer confined to a particular place or time, a phenomenon that is clearly illustrated by call centers (Ccs). The use of call centers by the business community has already become a common phenomenon in both developed and developing countries. In recent years, the call centre industry has experienced a phenomenal growth worldwide (AS. Saber, *et al*, 2004). The call centre industry is one of the most rapidly growing in the developed world today (Staples, Dalrymple & Phipps, 2001). Business processing outsourcing organizations commonly known as call centre, work when rest of the India sleeps. There is a graveyard shift starting at 4 am. Working in such shifts has started showing hazardous results on the health of Indian youth. (K.Tamizharasi *et al.,* 2012) According to a survey of 100 women, the average age group of women working in call centre is 18-30 yrs, which include those who are just school pass, graduates and even housewives. Hence, call centers have emerged as the most sought after workplace for Indian women in recent times. Due to intensive work pressure, requiring high levels of concentration, the performance of employees deteriorates, also performing one type of activity throughout the day. A call centre or center is a centralized office used for the purpose of receiving and transmitting a large volume of requests by telephone. Long hours of work, permanent night shifts, incredible high work targets, and health problems have become a major issue. The employees often complaint of headaches, stomach related problems, eye and head strain, muscular

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skeletal problems, menstrual irregularity. The Hindu Business Line report (2013) evaluated that balanced lifestyle is very tedious and the survey found 36% respondents were obese, 21% suffered from depression and 12% had high blood pressure. Gupta, (2013) reported that along with other problems amongst women working in BPO, higher percentage suffered from high blood pressure. One of the potential hazards reported by call handlers due to prolonged use of handsets, intense use of computers and continuous use of handling calls, they face ear ,eyes and vocal problems. Pandey & Bali, (2011) observed that 30-40 per cent of the employees working in call centers complaint of eye problems. There is soreness, dryness, blurred vision, light sensitivity, headache and croakiness of voice, irritating cough, poor visual power. The cumulative effect of odd working hours and stressful environment leads to vision problem (dry, itchy throat, hoarseness , cracking, cough etc.), eye strain and pain along with hearing problem (ear pain, ringing in ear) (Ofreneo, *et al.* 2007). Kunhe, *et al*.(2012), findings revealed that musculoskeletal disorders involving the neck, upper back, lower back, right shoulder, upper right arm, hand and wrist have been reported among Filipino shift workers in several researchers. R. Naveen, *et al.*(2012), conducted a study on call handlers in call centers situated in and find out that the majority of the respondents (50%) had some problems related to their vocal health, 22 (12.5%) complained of problems related to their ears and 126 (71.6%) of the respondents had musculoskeletal pain and the commonest region being the neck and the back. Many of the shift workers digestive disorders may be attributed to both the irregularity of meal timings and poor quality of the food consumed like increased consumption of pre packed foods with preference to salty meals and little preference to vegetables, increased consumption of caffeinated drinks and alcohol, increased smoking, short sleeping hours and little physical exercise. (Suwazono, *et al.,*2003). Banu, P.*et al.* (2014), reported in their study that 31.3% of respondents working in BPO sector suffered from menstrual disorder due to stress. The night work, high pressure and social alienation leads to high levels of stress among the women and therefore ,in order to continue working in the call centers the women need to cope up with the stress and get constant parental support revealed in a study conducted by Gupta (2013). Ho, Ples, *et al*. (2007), also conducted a study to investigate common work-related health complaints and assessed problems relating with the complaints of call centers in Quezon City, Philippines. The survey was conducted in 96 call centers selected randomly. There were more female participants (53%) than male (47%) in the study. Among female and male respondents, only 37.3 % and 51% were working at night, respectively. Most of these respondents who had work- related health complaints were females (84%) compared with males (78 %). The majority of call centre agents employed during the night (69%) and day (64.8 %) admitted that they are stressed from their work. work stress was significantly related to workers sleep irritability (R = 0.328) and insomnia (R= 0.24: P< 0.03). Other reasons recognized by respondents in relation to the sleep problem (51%), insufficient exercise (41%) and poor diet and eating habits (24%) Common complaints presented by respondents were eye strain (35 %), cough (29 %), worsening of eyesight (26 %) and back pain (26%). The result of the study suggests that sleep problems and stress are relatively common among call center agents working in shifts.

Materials and Methods

The study was conducted on 300 young female employees (18-37yrs) working in a call centre. The subjects were selected from 'Genpact' a call centre located in Gurgaon (Haryana). The subjects were selected through purposive sampling method. The employees were screened for health problems such as blood pressure level, vision problem, throat problems, ear ache, stress, musculoskeletal health, menstrual irregularity, gastro-intestinal problems and social health or interaction with the family. The information related to their demographic and work profile was collected using a questionnaire and physical health through interview method and health check up. The Blood pressure measurement was taken using an automatic blood pressure monitor device. Descriptive statistics such as mean, frequencies and % were used to study the variables.

Results and Discussion

In this study the response rate was 100%. The results and analysis of the subjects are as follows:

Demographic profile

The age of all 300 female subjects were obtained with a span of 18-37 years with a mean of 23.46 ±3.88 years. Major part belonged to age group of 18-23years and 23-28 years respectively (47.7% and 39.3%). Most of the females were single / unmarried (64.4%) and rest married (35.3%). The maximum strength of the employees (65%) possess masters degree and rest

were graduates (19%), under graduates (9%) and high school 7.%.

Work profile

In this study 86 females (28.7%) had work experience of minimum six months and 92(30.7%) females had experience of an year, 65(21.7%) reported to be working with the company for about two to three years and 67(22.3%) with an experience of an year or two. The total number of breaks while on shift was around 2 to 3 for a span of twenty minutes. 170(56.7%) females worked for five days a week and rest six to seven days i.e. 110 & 20(36.7% & 6.6%) respectively. It was observed that 81 (66%) females were on morning duty and 84 evening shifts (28%) and 69(23%) doing night shifts and 66(22%) day duty.

Health status

The mentioned below variables were studied to assess their health status. And the following data was revealed :

(i) Blood pressure: The immense job pressure and curiosity to meet the targets either lead to high blood pressure or low blood pressure. The data revealed that majority of respondents had normal blood pressure (77.3%) and the percentage of females with low blood pressure was 16% whereas the percentage was very low for those possessing high blood pressure i.e., 6.7%. Similar findings revealed in a study conducted by Banu P. *et al,(*2014), in his study stated that blood pressure is directly proportional to work stress. BPO employees always have heavy work load and more work pressure and therefore 50.7% of respondents are having high blood pressure, the study revealed.

(ii) Hearing, vocal and vision problem: Long sitting hours with repeated calling, use of headset and visual display unit had effected the employees immensely. Pandey & Bali, (2011) in their study observed that 30-40 per cent of the employees working in call centers complaint of eye problems. There is soreness, dryness, blurred vision, light

Table 1: Health status of female employees working in call centre

Variables	No. of respondents(n=300)	
	f	%
Blood pressure		
High(140/90 mm Hg)	20	6.7
Normal(120/80mm Hg)	232	77.3
Low(90/60 mm Hg)	48	16
Hoarse Voice	97	32.3
Vision problem	150	50
Ear ache	53	17.7
Musculoskeletal problems		
Shoulder joint	101	33.6
Wrist joint	35	11.7
Neck and back pain	110	36.7
None	54	18
Acidity problem		
Yes	132	44
No	168	56
Change in bowel movements / constipation	87	29
Yes	213	71
No		
Occupational stress		
Yes	189	63
No	111	37
Lack of sleep		
Yes	160	53.3
No	140	46.7
Social health /interaction with family	154	51.3
Yes	146	48.7
No		
Irregularity of Menstrual Cycle		
Yes	238	79.3
No	62	20.7

sensitivity, headache and croakiness of voice, irritating cough, poor visual power. Similarly in the present study it was found that majority of the respondent's complaint of vision problem (50%) and hoarse voice (32.3%), whereas the percentage was low for ear ache problem i.e. (17.7%).

(iii) Musculoskeletal health: The problems related to bones were most prevalent. 33.6% and 36.7% complaint of shoulder pain and neck & back pain. Pain in wrist joint was less common i.e. 11.7%. Kunhe, *et al*. (2012), findings also revealed the musculoskeletal disorders involving the neck, upper back, lower back, right shoulder, upper right arm, hand and wrist have among Filipino shift workers in several researches.

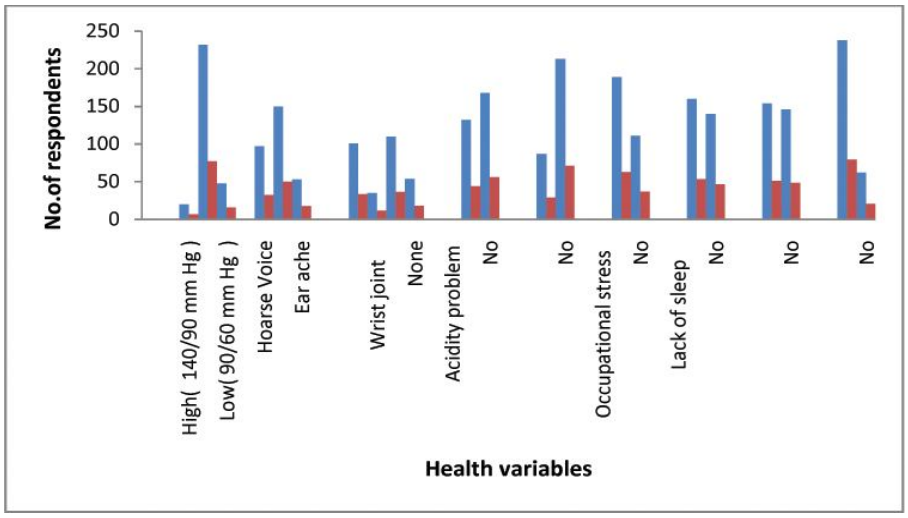
(iv) Acidity problem and constipation: Irregular eating pattern and wrong food habits along with their shift duty lead to acidity problem in many of the respondents. 44% of the total respondent's complaint of acidity. 29% faced difficulty in passing motion or were most of the time constipated. The most common complaints are disturbance of appetite, irregular bowel movements and constipation, abdominal pain, flatulence and few may develop serious problems like chronic gastritis, gastro duodenitis and peptic ulcers (Giovanni, *et al.*, 2014).

(v) Occupational Stress: Job pressure to meet the daily targets and satisfy the customers on call caused occupational stress. This was relevant in majority of the females (63%) in the females studied. The scenario was same for the females facing lack of sleep (53.3%) for those working in call centre. The odd working hours along with dual burden of work and family leads to high level of stress among women employees(Wilson *et al.*2007).

(vi) Social health: It was found that hectic schedule and no time for sleep and changing shifts have affected their social life. Most of the females (51.3%) reported to have lack of interaction with their family members or others.

(vii) Menstrual problem: Irregularity in menstrual cycles was found in majority of the females i.e. 79.3%.

Fig 1: Showing health status of females working in call centre



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References

1. As-Saber, S.N., Holland, P. & Teicher, J.2004. "Call Centers in India: An Eclectic Phenomenon in Global Human Resource Management". *Labor and Industry*, 14(3).
2. Banu P, Gomathi V.April 2014. "Physical illness faced by women employees working in BPO industry". *Indian Journal of Applied Research* .4(4): 2-3.
3. Giovanni Costa,Simon Folkard, JMalcolm Hrarington.2014."Shift work and extended hours of work". In Peter J.Baxter, Peter H Adams, Tar-Ching AW, Anne Lockeroft, JMalcolm, editors. *Hunter's Diseases of Occupations*. 9th Edition.581-589.

4. Gupta Amrita.2013."Health, Social and psychological problems of women employees in BPO: A study in India". Also cited at: http://paa2012.princeton.edu/papers/121676.

5. Ho Howell,Ples Michael, Su Glen Sia.30th June,2007."Sleep problems, work stress and health complaints in call centers in Quezon city, Philippines".*e Health International Journal*.21-24.

6. Kunhe JingkyP.Lozano, AMariaEliza R FM Gayline, *et a*l. 30th Jan 2012."Shift work research in the phillipines; current state and future directions" .*Philippines Science Letters*: 5(1):23-25.

7. Panday, Dr.Anoop and Bali, Ms.Ritu. Business Process Outsourcing challenges and opportunities, IndiraManagement,Pg.30-34, July2011.|7)BPO E -Sat survey2007, http://www.bp3.blogger.com/BPO E-Sat survey 2007.html.

8. R Naveen,Joseph Bobby.Sep 2012." Call handlers and their health problems an Indian Scenario'. *International Journal Of Basic Medical Sciences*. 3(3): 61-66.

9. Staples,W.J.S, Dalrymple, J.F.& Phipps, K.2001. Excellence in Call Centers: access is corporate responsibility. Paper presented at the *6th International Conference on ISO 9000 and TQM*, School of Business – HKBU (ISBN 962-86107-2-4).

10. SuwazonoY, OkuboY, Kobayashi E, KidoT, Nogawa.K.Oct 2003. "A follow up study on the association of working conditions and lifestyle with the development of perceived mental symptoms in workers of a telecommunication enterprise". *Occupational Medicine (London)* .53(7):46-442.

11. Uma Rani,R.,Tamizharasi, K., & Saravanan,M. 2012.Management of stress among employees n BPO using clustering algorithm. *CiiT International Journal.*

12. Wilson MG,Polzer A Debruyne,Chen S Fernandes S. 2007. "Shift work intervention for reduced work family conflict".Employees relations .29(2): 162-77.

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Original Article

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Impact of Dietary Intervention on Nutritional Status of Rural School Children

Kaur Jasmine*, Sadana Balwinder, Singla Neerja*****

Abstract

A total of 60 children in the age group of 7-9 years, belonging to low income group of rural areas in Ludhiana district were screened for their haemoglobin and surveyed for their food intake before and after nutritional intervention. All the children were dewormed before feeding trial. Half of the subjects were taken as the control and the remaining half were fed with supplementary products namely *ladoo*, biscuits, *matri* and *seviyaan*, providing 400 kcal energy, 8.6 g of protein, 1269µg of beta carotene, 34 mg of vitamin C, 167 mg calcium and 7.7 mg of iron per day for 120 effective days. Supplementary feeding showed a significant increase in haemoglobin levels and weights of the experimental group children, thereby reducing prevalence of protein energy malnutrition among them.

Keywords: Rural Children; Haemoglobin; Supplementary Products; Intervention.

Introduction

Child malnutrition is the burning issue for developing India. Reports suggest that about 48 per cent of children below age of 9 are found to be malnourished. The malnutrition level in country seems to be increasing every year [12]. Malnutrition continues to be a primary cause of ill health and mortality among children in developing countries. It is a major public health problem and accounts for about half of all child deaths worldwide. About 150 million children in developing countries are still malnourished and more than half of underweight children live in South East Asia Region [6].

Childhood malnutrition diminishes adult intellectual ability and work capacity. Malnourished women tend to deliver premature or small babies who are more likely to die or suffer from suboptimal growth and development. Poor early nutrition leads to poor school readiness and performance, resulting in fewer years of schooling, reduced productivity, and earlier childbearing. Thus, poverty, under nutrition and ill-health are passed on from generation to generation. Worldwide more than 50 per cent of women of reproductive age are being affected. Under nutrition impedes economic progress in all developing countries [1].

The prevalence of anaemia in the pregnant women is the highest among the countries in South East Asia. Anaemia is causing red alert for Indian women and children [11]. India has shown remarkable progress and has a number of nutrition intervention programs, but malnutrition remains highly prevalent in the poor states of the country. Malnutrition results due to imbalance between the needs of the body and the intake of nutrients. In India, gender inequality in nutrition is present from infants to adulthood. Women and girls never reach their full growth potential due to nutritional deprivation. It may be due to poverty, lack of awareness, illiteracy and gender differences [8].

Material and Methods

A total of 120 malnourished school children in the age group of 7-9 years belonging to low income group were purposively selected for the study. A two stage sampling technique was used for the selection of subjects. First stage consisted of convenient sampling of the school in Phullawal village in the vicinity of Ludhiana city of Punjab. Second stage consisted of

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purposive selection of malnourished and anaemic school children. Sixty children in the age group 7-9 years studying in third and forth standards were selected by simple random sampling technique.

The selected children were divided into two groups namely Control (C) and Experimental (E) having 30 children each, comprising 50% each boys and girls. Supplementary feeding of value added products was given to the children under E group for 120 days.

A survey regarding food consumption of the school children using 24 hour recall method [4] for 3 consecutive days was conducted before and after supplementary feeding. For calculations of daily nutrient intake of each subject, "Diet Cal" Software [7] was used and the average nutrient intake of the subjects was obtained. The body weight and height of the subjects were recorded before and after supplementary feeding according to the standard methods by WHO [13].

To evaluate the nutritional status of the children, the data on height and weight were classified using standard deviation (z-score), (height for age, and weight for age and weight for height). The cut off point for malnourished children was taken as-2SD below the reference median as recommended by WHO, 2006. Children falling between -2SD and -3SD of standard were considered as moderately stunted, underweight or wasted and those below -3SD were classified as being severely malnourished. Measurement of height was taken with help of anthropometric rod to the nearest 0.5 cm while the body weight of the subjects was recorded using portable weighing machine.

Feeding of the children in the experimental group with iron and beta carotene rich value added products namely *laddu*, biscuits, *matri* and *sewiyaan* (prepared by incorporating Bengal gram and colocasia leaves powder and *amla* powder) was carried out for 120 effective days. The children of the control group did not receive any supplementation. Supplementary feeding provided 400 kcal energy, 8.6 g of protein, and 1269µg of beta carotene, 34 mg of vitamin C, 167 mg calcium and 7.7 mg of iron to the experimental group children. At the end of the study period, weights and heights of both the groups were measured again.

Blood was also analysed for haemoglobin level to see the impact of intervention. The results were analyzed statistically using paired't' test (Data analysis by using Statistical Package for Social Sciences (SPSS) Software.

Results and Discussion

The mean daily food intake of both the groups before supplementation for various food groups is given in Table 1. The children of E group were given nutritional intervention of iron and beta carotene rich food products. The additional food groups through supplementation provided cereals (66 g), pulses (9 g), green leafy vegetables (14.7 g), fruits (12.5 g), fats and edible oils (12.5 g) and sugar (7.5 g). The energy intake of the E group without supplementation was 622.4 ± 143.2 Kcal, protein 20.7 ± 4.7 g, fat 16.9 ± 6.4 g, calcium 180.7 ± 25.0 mg, iron 5.7 ± 1.4 mg, vitamin C 22.8 ± 13.6 mg and beta carotene 204.9 ± 205.7 µg per day (Table 2). The corresponding values for the C group were 601.4 ± 145.3 Kcal, 20.3 ± 4.3 g, 17.2 ± 9.2 g, 179.9 ± 24.5 mg, 4.6 ± 1.0 mg, 23.3 ± 12.1 mg and 204.3 ± 205.7 µg. The supplements provided additional nutrients as 400 kcal energy, 8.6 g of protein, 1269 µg of beta carotene, 34 mg of vitamin C, 167 mg calcium and 7.7 mg of iron to the experimental group children, thus showing significant increase in the intake of all the nutrients by the E group when compared to the C group (Table 2).

Nutritional intervention enhanced the per cent adequacy of energy, protein, fats, calcium, iron, vitamin C and beta carotene by 22.7, 29.9, 41.7, 27.7, 48.1 and 26.4 per cent, respectively in E group children, when compared with per cent adequacy of corresponding nutrients before supplementation.

Similarly, the shortbread-based biscuits (cookies) were designed to provide 50% of the recommended dietary allowances of iron (5 mg ferrous fumarate), iodine (60 ìg potassium iodate), and â-carotene (2.1 mg) for children aged 7–10 years. The sugar-based cold drink was to provide 90 mg vitamin C. The results showed that the percentage of children with low serum ferritin concentrations in the intervention group decreased from 27.8% to 13.9%. The prevalence of anaemia decreased from 29.6% to 15.6% in the intervention group and from 24.5% to 19.4% in the control group [3].

The results also revealed that the mean weight of the control girls before experimentation was 20.9 ± 3.0 kg while after experimentation it increased to 21.1 ± 2.8 kg, whereas the mean weight of control boys remained the same i.e. 21.7 ± 1.5 kg (before and after experimentation). The mean weight of experimental girls and boys, before experimentation was 21.9 ± 3.2 and 20.5 ± 2.4 kg, respectively while after

experimentation it increased significantly ($p < 0.01$) to 23.5 ± 3.2 (girls) and 22.1 ± 2.2 kg (boys) respectively.

While the mean height of the children before experimentation in C group was 121.2 ± 4.3 (girls) and 122.6 ± 2.9 cm (boys) while in E group was 123.4 ± 5.8 (girls) and 122.3 ± 4.8 cm (boys), and after experimentation was 121.2 ± 4.3 (girls) and 122.6 ± 3.0 (boys) in C group and 123.4 ± 5.7 (girls) and 122.4 ± 4.7 (boys) in E group.

On similar basis, [10] conducted a study in rural Bangladesh among moderately-malnourished (weight-for-age between 61% and 75%) school children. Mothers of the first intervention group received intensive nutrition education (INE group) twice a week for three months. The second intervention group received the same nutrition education, and their children received additional supplementary feeding. After three months of interventions, a significantly higher proportion of children in the INE and INE+SF groups improved (37% and 47% respectively) from moderate to mild or normal nutrition compared to the comparison group (18%). At the end of six months of observation, the nutritional status of children in the intervention groups improved further from moderate to mild or normal nutrition compared to the comparison group (59% and 86% vs 30%).

The haemoglobin level of the respondents before experimentation in C group was 11.7 (girls) and 11.9 g / dl (boys) and 10.5 (girls) and 10.8 g / dl (boys) in E group, while after experimentation it was 11.8 (girls) and 12.0 g / dl (boys) in C group and 11.4 (girls) and 11.0 g / dl (boys) in E group.

A significant ($p < 0.05$) ($p< 0.01$) increase was observed in Hb level of respondents in E group, due to the consumption of value added products (supplemented with underutilized greens namely Bengal gram and colocasia leaves powder). However, the respondents in both the groups had Hb level less than normal level of 12.5 – 13.5 g / dl (WHO 2006).

These findings were in line with the study by (2) who studied the effect of probiotic (curd) and micronutrient rich leaf protein concentrate (LPC) and stated a significant rise in the haemoglobin level from 9.33 to 9.63 g / dl (before and after feeding probiotic curd) and 8.07 to 8.59 g / dl (before and after feeding LPC).

Similar results were given by [9] who conducted a nutrition intervention program on school children feeding them a local plant dish made of maize, beans and greens (185 g) along with meat (60 g) and found an increase in the average iron content of 1.51 mg. Micronutrient status of school children aged 6 – 11 years was assessed through consumption of fortified biscuits (rich in beta carotene, iron and iodine) and reported a decrease in the prevalence of anaemia from 29% to 15% [3]

To conclude, the data revealed that developed value added products rich in energy, protein, iron, vitamin C and beta carotene can be effectively used for the prevention and control of PEM and anaemia in children. Low income, illiteracy and inadequate food and nutrient intake were responsible for the under nourished state of health of these school children. The subjects before experimentation did not meet the basic food needs due to poverty, ignorance and lack of knowledge. However, supplementation increased food and nutrient intake, with an increase in anthropometry and biochemical parameters of the respondents of experimental group.

Table 1: Food intake (g) of rural school children (Mean±SE)

Food groups	SDI	Experimental group (E)			Control group (C)	t-value
		BS	Through supplements	AS	Total intake	
Cereals	180	121.5±26.3	66	183.8±27.3	116.5±26.3	6.28**
Pulses and legumes	60	32.0±13.0	9	41.5±10.4	32.0±13.0	3.22**
Green leafy vegetables	100	-	14.7	14.7±3.4	-	3.85**
Other vegetables	100	59.1±20.7	-	59.4±21.8	58.7±29.3	1.21^{NS}
Roots and tubers	100	37.8±19.0	-	39.9±15.4	38.3±15.5	1.20^{NS}
Fruit	100	12.9±2.3	12.5	25.4±7.9	12.6±6.6	2.41*
Milk and milk products	500	64.8±14.6	-	68.3±14.5	64.6±13.9	1.31^{NS}
Sugar	20	12.2±2.1	7.5	19.7±12.5	11.8±4.8	1.93*
Fats and oils	30	12.0±6.0	12.5	24.5±16.8	12.4±7.6	2.40*

SDI-Suggested Dietary Intake; BS-Before supplementation; NS-Non significant;
**-Significant at 1%

Table 2: Nutrient intake of rural school children (Mean±SE)

Nutrients	RDA	Experimental group (E)			Control group (C)	t-value
		BS	Through supplements	AS		
Energy (Kcal)	1690	622.4±143.2 (36.8)	400	1006.4±140.5(59.5)	601.4±145.3	4.64**
Protein (g)	29.5	20.7±4.7 (70.1)	8.6	29.7±5.2 (100)	20.3±4.3	1.9*
Fat (g)	30	16.9±6.4 (56.3)	20.5	29.4±4.3 (98)	17.2±9.2	1.2*
Calcium (mg)	600	180.7±25.0 (30.1)	167	347.7±32.1 (57.8)	179.9±24.5	3.17**
Iron (mg)	16	5.7±1.4 (35.6)	7.7	13.4±1.9 (83.7)	4.6±1.0	2.58**
Vitamin C (mg)	40	22.8±13.6 (57.0)	34	36.8±15.0 (92.0)	23.3±12.1	6.69**
Beta-carotene (µg)	4800	204.9±205.7 (4.2)	1269	1473.6±220.5 (30.6)	204.3±205.7	2.50**

RDA-Recommended dietary allowances; BS-Before supplementation;
**-Significant at 1%; *Significant at 5%; Parentheses indicate % adequacy;

Table 3: Anthropometry and haemoglobin (Mean±SE) of rural school children

Parameters	Control group (C)					Experimental group (E)				
	BS		AS		t-value	BS		AS		t-value
	Girls	Boys	Girls	Boys		Girls	Boys	Girls	Boys	
Hb(g/dl)	9.2±0.4	9.7±0.6	9.3±0.4	9.8±0.6	0.6^{NS}	8.5±0.3	8.8±0.3	10.4±0.5	10.5 ±0.2	3.2**
Weight (Kg)	20.9±3.0	21.7±1.5	21.1±2.8	21.7±1.6	1.4^{NS}	21.9±3.2	20.5±2.4	23.5±3.2	22.1±2.2	2.1**
Height (cm)	121.2±4.3	122.6±2.9	121.2±4.3	122.6±3.0	1.6^{NS}	123.4±5.8	122.3±4.8	123.4±5.7	122.4±4.7	1.6^{NS}

BS-Before supplementation; AS-After supplementation; NS-Non significant;
**-Significant at 1%

References

1. Allen L M and Gillespie S R (2001) *What Works? A review of the efficacy and effectiveness of nutrition interventions*, Asian Development Bank, Philippines pp: 1-24.
2. Dewan P, Kaur I and Chattopadhya D (2007) A pilot study on the effect of curd (dahi) and LPC in children with protein energy malnutrition. *Ind J Med Res* 126: 199-203.
3. Elizabeth M, Kvalsvig D, Faber M and Kruger M (2000) Effect of iron and beta carotene – fortified biscuits on the micronutrient status of primary school children. *Am J Clin Nutr* 69: 497-503.
4. ICMR (2010a) *Dietary guidelines for Indians*. A manual of National Institute of Nutrition, Hyderabad, India.
5. Joshi H S, Joshi M C, Singh A M, Joshi P M and Khan N (2011) Determinants of protein energy malnutrition (PEM) in 0-6 years children in rural community of Bareilly. *Ind J Prev Soc Med* 42: 154-58.
6. Kaur G (2014) Diet Cal software: A tool for dietary assessment and planning, deptt. of dietetics, All India Institute of Medical Sciences, New Delhi.
7. Krishnan M, Rajalakshmi P V and Kelaiselvi K (2012) A study of Protein Energy Malnutrition in school girls of rural population. *Int J Nutr Pharmacol Neuro Dis* **2**: 142-46.
8. Neumann C, Bwibo C. Gewa C and Drorbaugh N (2011) Animal-source foods as a food-based approach to address nutrient deficiencies and functional outcomes: a study among Kenyan school children, FAO: 117-36.
9. Roy S K, Fuchs G J and Mahmud Z (2005) Intensive nutrition education with or without supplementary feeding improves the nutritional status of moderately malnourished children in Bangladesh, *J Health Popula Nutr* 23:320-30.
10. The Hindu (2005) Anaemia Free India campaign launched. Online Edition of India national newspaper pp: 20.
11. Upadhyay K, Khanna V and Gandhi H (2013) Child malnutrition in India – a brief review. *J Asian Res Consortium* **3**: 1-17.
12. WHO (2006) World Health Organization Child Growth Standards: Length / height-for-age, weight-for-age, weight-for-length, and weight-for-height: methods and development WHO, Geneva.

Original Article

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Impact of E-Counseling on Nutrient Consumption of Female Employees Working in a Call Centre

Shivani Sharma*, Vandana Bharti**

Abstract

Evolution is a long-term process of change, where desired characteristics are retained, undesirable ones allowed to regress, and undeveloped ones encouraged. Modernization, which has reformed the initial systems of work practices have also reformed the lives of the people. They want to be more productive, more involved, recognized and have stronger working relationships now. The impact of globalization on the transformation from traditional to modern business practices and operations in India is felt prominently with the development of call centers in the past few years. Call centers in today's world, plays an integral part of the most of the organization and plays a key role in the service delivery chain. It has given a new dimension to the work culture in Modern India. India's twelve hour time difference enables global organizations to provide their customers with 24 x 7 x 365 days services. This shift work alters the normal circadian rhythmicity – giving rise to concerns regarding health and well being. Odd working hours and poor patterns of eating result in poor nutrition. A total of 150 female subjects (n=150) were purposively selected for the present study and divided into two stages – initial and final stage (post counseling period). The data was collected using questionnaire method and 24hour dietary recall method. The subjects were counseled via "e-counseling" and various other methods of counseling such as PowerPoint presentation, personal counseling and printed material for a period of six months on the topics such as healthy diet, balanced diet, protein rich diet, and diet for maintaining normal weight, healthy food options etc. After six months the subjects were re-assessed for the present study. The feed-back of subjects included in the study group was received through either personal visits or e-mail. 92.0% of the subjects provided feed-back most frequently by personal visits while rest 8.0% responded through by e-mail. The age of all subjects were obtained with a span of 18 to 37 years with a mean spread of age was 23.46±3.88 years while 158.82±6.34 centimeter was reported as mean spread of height. It was inference statistically that the females were found with significantly differed calcium value. In study group after counseling, the mean consumed energy (1293.68 kcal), carbohydrate (298.71 gram), proteins (44.34 gram) and fat (46.81 gram) were reduced at final stage as compared to initial mean consumed energy (1302.68 kcal), carbohydrate (304.89 gram), proteins (45.49 gram), fat (47.89 gram) but the mean iron (31.30 milligram) was little bit higher as compared to initial mean iron (31.06 milligram) and these mean differences in two sampling stages were not confirmed significant ($p>0.05$). At post stage, the mean calcium (653.50 milligram) value were lower as compared to mean calcium (690.20 milligram) at initial stage and this difference was statistically strongly significant ($p<0.001$). Therefore, it was concreted that administration of counseling benefitted the recipients in the experimental group and is effective..

Keywords: Call Centre; Recommended Dietary Allowances (RDA's); E-Counseling; Nutrients.

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Introduction

In recent years, the call centre industry has experienced a phenomenal growth worldwide (AS. Saber *et al*., 2004). Hence, according to a survey of 100 women, the average age group of women working in

call centre is 18-30 yrs, which include those who are just school pass, graduates and even housewives, call centers have emerged as the most sought after workplace for Indian women in recent times. Many of the shift workers digestive disorders may be attributed to both the irregularity of meal timings and poor quality of the food consumed like increased consumption of pre packed foods with preference to salty meals and little preference to vegetables, increased consumption of caffeinated drinks and alcohol, increased smoking, short sleeping hours and little physical exercise (Suwazono, *et al.,* 2003). Similarly, Salimpade (2011), study on Nutrition-related lifestyle practices, Dietary Patters, Nutrient Intake and Nutritional Status of Selected call center agents. The study arrived to determine association of nutritional status & Nutrition related lifestyle practices, dietary pattern and nutrient intake among selected call center agents. One hundred call centre agents of Metro Manila were interviewed on physical activity. Majority was normal in nutritional status. The adequacy of intakes of energy carbohydrates & fats were generally poor except for female group < 12 yrs old, because of their erratic schedule. Hence, concluded that there were no association found b/ w nutritional status and the following variables – nutrition related lifestyle, dietary pattern and nutrient intake. Adala, *et al*.(2007), found that 75% of its employees have normal BMI while the rest are either overweight, obese or underweight based on the BMI classification for adults . The meal patterns and dietary intake were also determined in the study using the Food frequency Questionnaire and 24-hr dietary recall method, respectively. The results for Vitamin A, Vitamin C, Thiamin, Niacin and Riboflavin were adequate based on the recommended dietary allowance. This is probably due to the employees, intake of vitamins and dietary supplements. However, calcium levels were found to be inadequate.

Materials and methods

The study was conducted on 300 young female employees (18-37yrs) working in a call centre named "Genpact" located in Gurgaon (Haryana). The subjects were selected through purposive sampling method and counseled for a period of six months via e-counseling. Personal visits, power point presentations and printed material or pamphlets was also used along with e-counseling for imparting information and knowledge on diet. "E-Counseling" is modern method of counseling which means use of email / internet for counseling purpose. The information was collected through questionnaire and 24 hr dietary recall method and then nutritive values was calculated. The nutrients were calculated by especially designed computer software based on nutritive value of Indian foods by *C. Gopalan (1996)* and consumed nutrients were checked against recommended dietary allowances *(ICMR 1989)* for the assessment of nutrient intake status. After six months the subjects were re-assessed for the present study. The feed-back of subjects included in the study group was received through either personal visits or e-mail. Descriptive statistics such as mean, frequencies and % were used to study the variables. Z-test was used to identify the significance of mean differences in nutritive values between initial and final observations in study group.

Results and Discussion

In this study the response rate was 100%. The results and analysis of the subjects are as follows:

Demographic profile

The age of all 150 female subjects were obtained with a span of 18-37years with a mean of 23.46 ±3.88 years. Major part belonged to age group of 18-23years and 23-28 years respectively (47.7% and 39.3%). Most of the females were single / unmarried (64.4%) and rest married (35.3%).The maximum strength of the employees(65%) possess masters degree and rest were graduates(19%), under graduates (9%) and high school 7%.

Work profile

In this study 86 females (28.7%) had work experience of minimum six months and 92(30.7%) females had experience of an year ,65(21.7%) reported to be working with the company for about two to three years and 67(22.3%) with an experience of an year or two .The total number of breaks while on shift was around 2 to 3 for a span of twenty minutes . 170(56.7%) females worked for five days a week and rest six to seven days i.e. 110 & 20(36.7% & 6.6%) respectively. It was observed that 81 (66%) females were on morning duty and 84 evening shifts (28%) and 69(23%) doing night shifts and 66(22%) day duty.

Nutrient consumption

The nutrient consumption of subjects was different in initial and final stages at post e-counseling

observations. The study revealed that 9.3% & 6.7% of females consumed normal calories as per RDA's i.e. (1875kcal/d) in the study group at both stages. Majority of population i.e. 44% recorded with inadequate calorie intake in initial stage, whereas a slight increase in number seen in post e-counseling stage as 49.3%. 27.4% at initial stage consumed adequate amount of calories i.e.1375-1775 kcal /d.

Table 1: Distribution of nutrients consumption among subjects (initial and final stage)

Variables	Reference	Range	Study group (n=150) Initial F (%)	Final F (%)
Energy(kcal/d) (Sedentary worker)	Reference RDA's 1875 kcal/d	1875 Kcal/d	14(9.3%)	10(6.7%)
	More than reference	1875-2375 kcal/d	11(7.3%)	5(3.3%)
	Adequate	1375-1775 kcal/d	41(27.4%)	37(24.7%)
	Inadequate	875-1375 kcal/d	66(44%)	74(49.3%)
	Poor	500-875kcal/d	18(12%)	24(16%)
Carbohydrates(g/d)	Reference 373gms/d	373 g/d	2(1.3%)	1(0.7%)
	< reference	97- 365 g/d	124(82.7%)	129(86%)
	➢ Reference	370 - 482 g/d	24(16%)	20(13.3%)
Proteins(g/d)	Reference 50gms/d	50g/d	6(4%)	3(2%)
	< reference	20-49g/d	90(60%)	62(41.3%)
	➢ Reference	51-99g/d	54(36%)	85(56.7%)
Fats (g/d)	Reference 20g/d	20g/d	5(3.3%)	3(2%)
	< reference	11-19g/d	2(1.3%)	2(1.3%)
	>reference	28-97g/d	143(95.4%)	145(96.7%)
Iron (g/d)	Reference 30g/d	30g/d	6(4%)	10(6.7%)
	< reference	4-29g/d	60(40%)	50(33.3%)
	➢ Reference	31-60g/d	84(56%)	90(60%)
Calcium (mg/d)	Reference 400mg/d	400mg/d	0	0
	< reference	120-394mg/d	24(16%)	29(19.3%)
	➢ Reference	410-1000mg/d	126(84%)	121(80.7%)

Source: RDA'S by ICMR (1989)

Table 2: Consumption of nutrients between initial and final stages of post e-counseling period

Variables		STUDY GROUP (n=150) Mean±SD	MD	Z-Value
Energy(kcal)	Initial	1302.68 ± 419.05	9.33	0.14 (p<0.05)
	Final	1293.35 ± 832.24		Not significant
Carbohydrates(gm)	Initial	304.89 ± 94.82	6.18	0.92 (p<0.05) Not significant
	Final	298.71 ± 92.33		
Proteins(gm)	Initial	45.49 ± 14.51	1.15	1.26 (p<0.05) Not significant
	Final	44.34 ± 11.71		
Fats(grams)	Initial	47.89 ± 17.65	1.08	1.01 (p>0.05) Not significant
	Final	46.81 ± 14.88		
Iron(mg)	Initial	31.06 ± 9.35	0.24	0.60 (p>0.05) Not significant
	Final	31.30 ± 7.89		
Calcium(mg)	Initial	690.20 ± 295.84	36.70	3.47 (p<0.001) Highly significant
	Final	653.50 ± 245.94		

The post e-counseling stage observed a slight fall in the number to 24.7%. 12% females had poor intake of calories i.e. (500-875kcal/d) at initial stage and 16% at post e-counseling stage.

Very few females consumed carbohydrate as per the RDA (373gm/d) at initial and final stages as 1.3% & 0.7% respectively. 82.7% consumed carbohydrates less than the given RDA's (97-365gm/d) at initial

stage. A slight increase was seen in the final stage of experimental and 86%. 60% and 13.3% number of females consumed carbohydrates more than the given RDA's (370-482gm / d) at initial and final stage.

Further the table reveals protein intake of the female executives and it was found that very few consumed protein as per the reference value i.e. 50gm / d as 4% at initial stage and 25 % at final stage. 60% females moderate amount of protein i.e. (20-49gm / d) of the given RDA's whereas at the post stage of e-counseling 41.3% females consumed moderate amount of proteins. 36% consumed more than the reference protein at initial stage, whereas an increase was seen at post stage consuming protein more than the reference protein as 56.7%.

The fat intake in female executives at post e-counseling stage and initial stage revealed that the maximum number of females at initial stage consumed fat more than the reference value as 95.4%. A slight increase was noticed in the number of females consuming fat more than the RDA at final stages as 96.7%. 3.3% at initial stage reported to consume fat as per the RDA i.e. 20gm / d, respectively. A slight change was observed at final stage of post counseling period as 2% who consumed fat as per the RDA. Only 1.3% consumed moderate amount of fat at initial stage but no change was observed at final stage of post counseling period.

40% females consumed iron less than the RDA i.e. 30gm / d at initial stage and 56% consumed iron more than the reference values at initial stage. Very little change was seen at final stage of both the groups during post counseling period for those who were consuming moderate amount of iron and more than the reference value as 33.3% and 60% respectively. Only 4% females were observed with iron intake as per the RDA's at initial stage whereas 6.7% consumed iron as per the reference value at final stage.

The calcium intake was noted as 16% females consuming moderate amount of calcium at initial stage and at final stage it was found to be 19.3%. Maximum number of females consumed calcium more than the reference value i.e. 410-1000mg / d as 84% and 80.7% at final stage were those who consumed more than the reference calcium.

The mean difference of the above mentioned results revealed that after counseling, the mean consumed energy (1293.68 kcal), carbohydrate (298.71 gram), proteins (44.34 gram) and fat (46.81 gram) were reduced at post stage as compared to initial mean consumed energy (1302.68 kcal), carbohydrate (304.89 gram), proteins (45.49 gram), fat (47.89 gram) but the mean iron (31.30 milligram) was little bit higher as compared to initial mean iron (31.06 milligram) and these mean differences in two sampling stages were not confirmed significant ($p>0.05$) on statistical ground with obtained z-value of 0.14,0.92 ,1.26,1.01 and 0.60, respectively .At final stage, the mean calcium (653.50 milligram) value were lower as compared to mean calcium (690.20 milligram) at initial stage and this difference was statistically strongly significant ($p<0.001$) with obtained z-value of 3.47.

Conclusion

At final stage, all nutrient parameters except carbohydrates and fats of female executives of study group were different and improved. The statistical confirmation indicated that the females in study group had significantly differed carbohydrate and iron at initial stage but significantly differed energy, proteins, iron and calcium at final stage.

Therefore, it was concreted that administration of counseling benefitted the recipients in the experimental group and is effective.

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References

1. Adala KB, Bolinguist EAB, Echon MAP,Vinluan KCJ. 2007. "Nutritional status of call centre agents aged 20-35years at a selected company". Thesis University of the Philippines Manila.
2. As-Saber, S.N., Holland, P. & Teicher, J.2004 . "Call Centres in India : An Eclectic Phenomenon in Global Human Resource Management". *Labour and Industry*, 14 (3).
3. Salimpade Hannah Yvette .14th Dec2011." Nutrition related lifestyle practices, dietary pattern , nutrient intake and nutritional status of selected call center agents". Posted in ; Chronic disease , GHF 2012, Research Project.
4. Suwazono Y, OkuboY,Kobayashi E,KidoT, Nogawa.K.Oct 2003. "A follow up study on the association of working conditions and lifestyle

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Review Article

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Health Benefits of Vegetarian Foods against Oxidative Stress and its Harmful Effect: A Review

Prajapati Minaxi R.*, Kamaliya Keshav B.**

Abstract

As a result of defense mechanism and as by-products of cellular metabolic processes which utilizing oxygen in human body, certain molecules called reactive oxygen species (ROS) and reactive nitrogen species (RNS) are normally produced. Later these molecules are converted into free radicals in the body. Many factors are associated with the production of free radicals *viz.* smoking, drinking alcohol, high fat diet, too much sun exposure, existence of pollutants in the air and even excessive much exercise and stress. Exogenous sources of ROS include asbestos, crystalline silica, coal, diesel, chromium, bleomycin, herbicides, nitric oxide, ozone, radiation, cigarette smoke. Free-radical mechanisms may cause several human diseases including cancer, atherosclerosis, malaria, rheumatoid arthritis and neurodegenerative diseases. Superoxide radical (O_2) and hydrogen peroxide (H_2O_2) are known to be generated in the brain and nervous system *in vivo*. When these free radicals are produced in excess, they can cause tissue injury. However, tissue injury can itself cause ROS generation, which may contribute to a worsening of the injury. ROS are involved in cell signaling, gene transcription, aging and enzymology. A variety of cancers generate ROS as well as diabetes and pulmonary conditions ROS generation is also associated with oxidation of lipoproteins.

Keywords: Antioxidant; Oxidative stress; Phytochemicals.

Introduction

Antioxidants are of interest to food industry because they prevent rancidity in food caused by oxidation of fat. Some antioxidant agents are usually added while preserving the food. These agents prevent the oxidation in food and rendering it in a fit for human consumption. Antioxidants are also of the interest to clinicians since they may help to protect the human body against damage by Reactive Oxygen Species (ROS). It has been shown that free radicals including reactive oxygen species like superoxide (O_2), hydrogen peroxide (H_2O_2) and hydroxyl radical (OHÚ) are known to be generate in many organs (brain and liver) as a product of normal metabolism and by radiation internally, they are formed during O_2 metabolism and lipid peroxidation. The purpose of antioxidant in physiological setting is to prevent ROS concentration from reaching a high level within a cell that may cause damage (Imlay, 2003).

Antioxidants act as protective agents against aerobic organism cell damage which is induced by ROS or other free radicals (Hallowell, 1997). The antioxidants are classified into two categories due to their function, enzymatic and non-enzymatic antioxidants (Silva, 2006).The antioxidant properties of vitamin C may stabilize folate in food and in plasma; increased excretion of oxidized folate derivatives in humans with scurvy has been reported (Stokes *et al.,* 1975).

Sources of antioxidants in human body

The body is endowed with complex antioxidant systems, which include exogenous antioxidants derived from the diet and endogenous antioxidants formed in the body (Young *et al.,* 2001). Cellular structure of human body itself provides natural defense against oxidative stress. There are two types of antioxidant defense systems exist in the human body i.e., enzymatic and non-enzymatic.

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Enzymatic Cellular antioxidants

Super- oxide dismutase, glutathione peroxidase, catalase and Glutathione transferees are the enzymes involved in neutralizing the free radicals produced in the human body (Schafer FQ et al, 2001).

Non-enzymatic

Tocopherol, thiols, vitamins viz. vitamin C and ß-carotene, minerals viz. selenium, metals, phytochemicals and phenolic compounds etc. are the compounds involved in free radicals neutralizing reaction.

Among these all vitamin C, ß-carotene, tocopherol, selenium and phenolic compounds such as flavonoids, anthocyanins, condensed tannins, lignans, cinnamic acids are of diet origin (Miller *et al*., 1995). These antioxidants may act at different levels in the oxidative process e.g. by scavenging initiating radicals, binding metal ions, scavenging peroxyl radicals or by removing oxidative damaged bio-molecules and other types of action.

Potential of fruits and vegetables against oxidative stress

Antioxidants refer to any substance that delays or inhibits oxidative damage to a target molecule. Lipids, proteins, nucleic acids, and carbohydrates are potential targets of oxidative damage. Antioxidants protect the target sample by scavenging oxygen-derived species, minimizing the formation of oxygen-derived species, binding metal ions, replacing damage to the target, and destroying badly damaged target molecules and replacing them with new ones. Antioxidants are largely found in plant foods chiefly in fruits and vegetable. These molecules neutralize the free radicals by donating an electron and reduce the incidence of chronic diseases and health risk related to the aging. Free radicals contain lots of energy and are reactive, unstable molecules. They contain only one electron in their outermost shell and need a second one to become stable (Halliwell *et al.,* 1995), which is provided by antioxidant. These free radicals may oxidize nucleic acids, proteins, lipids and DNA and can initiates degenerative disease.

Antioxidants present in Whole-Grain Cereals

Whole grain possess a range of antioxidant compounds that can complement those present in fruits and vegetables as cereals contribution in our diet is higher comparing with fruits and vegetables. Major phytochemicals in cereals include phytosterols, tocols, dietary fibers (mainly beta-glucan), lignans, alkylresorcinols, phytic acid, ã-oryzanols, avenanthramides, cinamic acid, ferulic acid, inositols and betaine (Slavin J 2003, Jones JM. *et al.* 2004, Adom KK. *et al.*2003). Avenanthramides in oats and have high antioxidant activity and a one serving of an oat meal could contribute to overall antioxidant potential of the daily diet which is greater than teas or fruit juices. Phytic acid of whole-grain cereals also acts as an antioxidant which chelates Fe and protect from free radical damage in the body. Bioactive compounds of wheat include Carotenoids, tocopherols, tocotrienols, phenolic acids, phytic acid, phytosterols and flavonoids (Zieli Å. *et al.*2000, Yu L, Zhou k and Parry J.W. 2005). These compounds are mainly found in bran i.e. outer most portion of the grain. It was found that, Ferulic acid is a predominant phenolic acid in wheat bran and it contributes around 99-231ìg/g (Zhou K, Su L, Yu LL .2004). Variety wise differences in antioxidant compounds are observed. Generally red variety of wheat possess high amount of antioxidants compared with white variety. Rice contain antioxidant compounds vitamin E and ã-Oryzanol. Content of ã-oryzanol in rice bran is 10 times that of vitamin E (Xu Z. *et al*.2001).

Antioxidants in nuts and oilseeds

Numerous studies have shown that nuts improve LDL to HDL ratios, thereby reducing inflammation which is associated with risk of cardiovascular disease. Together with favorable fatty acid profile, they also contain other bioactive compounds that give positive effects on cardiovascularhealth (Kris-Etherton et al., 2008). Other phytochemicals includes tocopherols and phytosterols, flavonoids, stilbenes, and resvertrol, as well ascarotenoids and arginine. The total phenolic constituents contribute to the total antioxidant capacity of nuts. The combination of functional ingredients present in nuts and rich nutritional composition makes them potential functional foods. It has been studied that the phenolic compounds of almonds act as antioxidants by interfering an activity of free radicals and chelating agents (Heim et al., 2002).

Conclusion

Each food has its own health benefits but when it comes to vegetarian foods, it is proven that, vegetarian foods such as fruits, vegetables, cereals, nuts are rich source of all essential nutrients with additional benefit of providing valuable phytochemicals to fight

against oxidative stress. Western countries are adopting a vegetarian as these foods have potential health benefits. Although, Non-vegetarian foods supply good quality of protein, there are lacking in functional properties. Overall health benefits of vegetarian diet helps in combating number of degenerative diseases.

References

1. Adom KK. *et al.* 2003. Phytochemical Profiles and Antioxidant Activity of Wheat Varieties. *J. Agric Food Chem*. 51: 7825-7834.
2. Halliwell, B. 1997. Antioxidants: The Basics-What they are and how to evaluate them: *Antioxidants in Disease Mechanisms and Therapy.* Academic Press. Toronto. 4.
3. Halliwell, B. and Gutteridge, J.M.C. 1995. The definition and measurement of antioxidants in biological systems*. Free radic. Bio. Med*., 18: (1) 125-126.
4. Imlay JA. 2003. Pathways of oxidative damage. *Annu. Rev. Microbiol*. 57: 395–418.
5. Jones JM. e*t al* .2004. Becoming Proactive With the Whole-Grains Message. Nutrition Today; 39: 10-17.
6. Miller, Rice an Evans. 1995. The reactive antioxidant activities of plant derived polyphenols. *Free radical Res*. 22: 375-383.
7. Slavin J (2003) why whole grains are protective: biological mechanisms. ProcNutrSoc 62: 129- 134.
8. Schafer F.Q., and Buettner G.R. 2001. Redox environment of the cell as viewed through the redox state of the glutathione disulfide/ glutathione couple. *Free Radic. Biol. Med.*30 (11): 1191–212.-212.
9. Silva, P.F.N. 2006. Physiology of peroxidation process in mammalian sperm. Ph.D. Thesis (Unpublished), Utrech University, Ridderprint, Ridderkerk. 5-36.
10. Stokes, P.L. 1975. Folate metabolism in scurvy. *American J. Clinic. Nutri.*28 : 126-129.
11. Vallyathan, V. and Shi, X. 1997. Exogenous ROS–The Role of Oxygen Free Radicals in Occupational and Environmental Lung Diseases. *Environment Health Perspectives.* 105.
12. Xu Z, Hua N, Godber JS .2001. Antioxidant activity of tocopherols, tocotrienols, and gamma-oryzanol components from rice bran against cholesterol oxidation accelerated by 2, 20-azo bis (2-methylpropionamidine) dihydrochloride. *J. Agric Food Chem*49: 2077-2081.
13. Yu L, Zhou k and Parry J.W. 2005. Inhibitory effects of wheat bran extracts on human LDL oxidation and free radicals. *LWT* 38: 463-470.
14. Zhou K, Su L, Yu LL.2004. Phytochemicals and antioxidant properties in wheat bran. *J Agric Food Chem.* 52: 6108-6114.
15. Zieli Å *et al.* 2000. Antioxidant activity and total phenolics in selected cereal grains and their different morphological fractions. J Agric Food Chem.48: 2008-2016.

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Dietary and Nutritional Interventions for Chronic Pain: Exploring the Behavioral Perspective

Nisha Rani Jamwal*, Kumar Senthil P.**

Abstract

Chronic pain was globally recognized as a condition with multifactorial etiology, multidimensional clinical presentation and multidisciplinary therapeutic delivery. The objective of this short communication was to throw light on dietary and nutritional supplementation as a management option for people with chronic pain. Although goal-directed healthcare and multidisciplinary rehabilitation dictated a comprehensive biopsychosocial approach to management, dietary interventions such as therapeutic fasting, oral cannabis, and oral tryptophan were reported to be effective dietary treatment options for people with chronic pain. The evidence however is too insufficient to provide any recommendation for practice.

Keywords: Analgesic Dietetics; Nutritional Analgesia; Dietetic Rehabilitation; Pain Management.

Introduction

Chronic pain was framed as a complex adaptive system with paradoxical beliefs and experiences being a part of the core characteristics of pain experience [1]. The implementation of Goal-Directed Health Care (G-DHC) involves a shift in process from the usual focus on disease-related goals such as relief of pain, titrating narcotic refills, and working on condition management to broader, long-term, personal goals along a model of patient-centered care [2].

Mainline therapy in the management of people with chronic pain involves medical / pharmacological therapy [3] whilst recent scientific developments and evidence-informed paradigm shift directed a rational integration of pharmacologic, behavioral and rehabilitation strategies in the treatment of chronic pain [4].

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Multidisciplinary rehabilitation involves a team of skilled professionals employing multiple therapies and a structured treatment plan to address all the dimensions of chronic painsuch as physical, emotional and social-role dysfunction [5]. An integrative medicine approach including complementary and alternative medicine therapies such as nutrition, supplements and herbs, manual medicine, acupuncture, yoga, and mind-body approaches is growing in popularity and use among chronic pain patients [6].

Therapeutic Fasting

Recent evidence from clinical trials shows that medically supervised modified fasting (200-500 kcal nutritional intake / day) with periods from 7 to 21 days is efficacious in the treatment of rheumatic diseases and chronic pain syndromes [7].

Cannabis

Martín-Sánchez et al [8] in their systematic review and meta-analysis of double-blind randomized controlled trials through search of Medline / Pubmed, Embase, and The Cochrane Controlled Trials Register (TRIALS CENTRAL) databases and identified 18 trials which concluded that cannabis treatment is moderately efficacious for treatment of chronic pain, but beneficial effects may be partially (or completely) offset by potentially serious harms.

Dietary supplementation using L-tryptophan:

Haze [9] explained that oral L-tryptophan administration decreased the perception of pain, drugs acting synergistically with the enkephalins and endorphins. Thus, use of drugs that either increased the serotonin level or block reuptake were associated with decreased pain perception, increased pain threshold, and improved sleep.

Anecdotally, chronic pain patients were managed using a traditional "patient and treatment uniformity myths" and the ensuing evidence recommends an individualized comprehensive treatment by subgrouping biophysical, psychosocial and behavioral measures that influence chronic pain and its experience [10].

Mechanism-based classification of chronic pain is essential for understanding and evaluating chronic pain as a condition with multifactorial etiology; multidimensional clinical presentation and multidisciplinary therapeutic delivery [11]. Such approaches not only facilitate symptom control but also improve quality of life in people with chronic pain [12].

From a therapeutic standpoint, dietary modification appears to be attractive, due to its low economic basis, decreased risk of addiction and dependence, as well as simplicity.Healthcare professionals need to shift their focus from a biomedical dimension to a behavioral dimension, [13] when they encounter people with chronic pain a lumping-to-splitting paradigm shift in clinical decision making is essential for successfully combating the chronic pain epidemic [14] along a 'think-out-of-the-box' perspective [15].

References

1. Brown CA.Mazes, conflict, and paradox: tools for understanding chronic pain. Pain Pract. 2009; 9(3): 235-43.
2. Ericksen JJ, Braverman DL, Shah RV.Interventions in chronic pain management. 4. Medications in pain management.Arch Phys Med Rehabil. 2003; 84(3 Suppl 1): S50-6.
3. Gallagher RM. Rational integration of pharmacologic, behavioral, and rehabilitation strategies in the treatment of chronic pain. Am J PhysMed Rehabil. 2005; 84(3 Suppl): S64-76.
4. Rudin NJ. Chronic pain rehabilitation: principles and practice. WMJ. 2001; 100(5): 36-43, 66.
5. Teets RY, Dahmer S, Scott E. Integrative medicine approach to chronic pain. Prime Care. 2010; 37(2): 407-21.
6. Michalsen A. Prolonged fasting as a method of mood enhancement in chronic pain syndromes: a review of clinical evidence and mechanisms. Curr Pain Headache Rep. 2010; 14(2): 80-7.
7. Martín-Sánchez E, Furukawa TA, Taylor J, Martin JL. Systematic review and meta-analysis of cannabis treatment for chronic pain.Pain Med. 2009; 10(8): 1353-68.
8. Haze JJ.Toward an understanding of the rationale for the use of dietary supplementation for chronic pain management: the serotonin model. Cranio. 1991; 9(4): 339-43.
9. Turk DC. Customizing treatment for chronic pain patients: who, what, and why. Clin J Pain. 1990; 6(4): 255-70.
10. Kumar SP, Saha S. Mechanism-based Classification of Pain for Physical Therapy Management in Palliative care: A Clinical Commentary.Indian J Palliat Care. 2011; 17(1): 80-6.
11. Kumar SP, Jim A.Physical therapy in palliative care: from symptom control to quality of life: a critical review.Indian J Palliat Care. 2010; 16(3): 138-46.
12. Prem V, Karvannan H, Chakravarthy R, Binukumar B, Jaykumar S, Kumar SP. Attitudes and Beliefs About Chronic Pain Among Nurses-Biomedical or Behavioral? A Cross-sectional Survey. Indian J Palliat Care. 2011; 17(3): 227-34.
13. Turk DC. The potential of treatment matching for subgroups of patients with chronic pain: lumping versus splitting. Clin J Pain. 2005; 21(1): 44-55.
14. Kumar SP. Thinking out of the box- from physiotherapy to rehabilitation. International Journal of Physiotherapy and Rehabilitation 2010; 1(1): 01-04.
15. Waters D, Sierpina VS. Goal-Directed Health Care and the chronic pain patient: a new vision of the healing encounter. Pain Physician. 2006; 9(4): 353-60.

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Reports of randomized clinical trials should be based on the CONSORT Statement (http://www.consort-statement.org). When reporting experiments on human subjects, indicate whether the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional or regional) and with the Helsinki Declaration of 1975, as revised in 2000 (available at http://www.wma.net/e/policy/l7-c_e.html).

Results

Present your results in logical sequence in the text, tables, and illustrations, giving the main or most important findings first. Do not repeat in the text all the data in the tables or illustrations; emphasize or summarize only important observations. Extra or supplementary materials and technical details can be placed in an appendix where it will be accessible but will not interrupt the flow of the text; alternatively, it can be published only in the electronic version of the journal.

Discussion

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.

References

List references in alphabetical order. Each listed reference should be cited in text (not in alphabetic order), and each text citation should be listed in the References section. Identify references in text, tables, and legends by Arabic numerals in square bracket (e.g. [10]). Please refer to ICMJE Guidelines (http://www.nlm.nih.gov/bsd/uniform_requirements.html) for more examples.

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.

More information about other reference types is available at www.nlm.nih.gov/bsd/uniform_requirements.html, but observes some minor deviations (no full stop after journal title, no issue or date after volume, etc).

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Tables should be self-explanatory and should not duplicate textual material.

Tables with more than 10 columns and 25 rows are not acceptable.

Number tables, in Arabic numerals, consecutively in the order of their first citation in the text and supply a brief title for each.

Explain in footnotes all non-standard abbreviations that are used in each table.

For footnotes use the following symbols, in this sequence: *, ¶, †, ‡‡,

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Type or print out legends (maximum 40 words, excluding the credit line) for illustrations using double spacing, with Arabic numerals corresponding to the illustrations.

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