



Impact of Complementary Education on Knowledge, Attitude and Practice Regarding Health and Nutrition among Primary School Children

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ABSTRACT

Background: Children who are healthier and have better diets are more likely to participate in school, pay attention in class and perform better academically. Schools are the best sites to teach students about nutrition but local governments and organizations for health professionals may also play a significant role in educating parents and children about nutrition. The present study was conducted among primary school children to see the impact of complementary education on knowledge, attitude and practice regarding health and nutrition.

Methods: A total of 250 primary school children (Girls: 125 and Boys: 125) aged between 7-10 years were selected from government schools of Ludhiana city. The statistics revealed the prevalence of clinical signs and symptoms associated with nutritional deficiency illnesses in both girls and boys. The study analysed the mean Knowledge, attitude and practice (KAP) scores obtained by girls and boys.

Result: The majority of the subjects (83.2%) achieved KAP scores between 20-40 per cent, while 16.8 per cent achieved scores between 40-60 per cent. However, after implementing a nutrition education intervention, the majority (80.8%) achieved KAP scores between 60-80 per cent. Attitudes were also significantly higher for girls (87.2%), while boys (82.4%) achieved scores between 40-60 per cent. Post-intervention, the majority (87.2%) of girls and boys achieved scores between 40-60 per cent. In terms of practices, a significant majority (96.8%) of girls and 97.6 per cent of boys achieved scores between 20-40 per cent. The study found that both girls (65.4%) and boys (64.5%) exhibited more than 60 per cent increase in their knowledge scores.

Key words: Attitude and practice, Complementary education, Knowledge, Primary school children.

INTRODUCTION

School is considered appropriate place for imparting complementary education due to its organized environment and teaching amenities. Nutrition education to children in school can improve their eating habits as children can be easily reached and are gathered among their peers in school (Ruzita *et al.*, 2007). The purpose of nutrition education is to make children more aware of the hazards associated with their present eating patterns, to educate them how to consume a well-balanced diet that includes a range of foods and to help them develop the ability to make informed food decisions on their own (Siew *et al.*, 2020).

A key metric for assessing quality of life, particularly in children, is nutritional status. An effective method for assessing the nutritional status of populations, especially youngsters, is anthropometry. It is a low-cost method of assessing the short and long-term nutritional status of children and a sensitive indicator of their health, growth and development (Sinha *et al.*, 2024). The improvement of the nutrition status of children under the age of five is the main focus of national and state-level health initiatives, whereas school age children are usually ignored. The school age is the most crucial stage as body prepares itself to store nutrients for rapid adolescence growth (Das *et al.*, 2014). Therefore, it is critical to evaluate their current condition of health, nutrition and functional ability in order

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to maintain their optimal physical and mental growth (Singh and West, 2004). So, diet is one of the fundamental components to uphold physical and mental development. Including the necessary levels of key elements in the diet and ensuring that they are properly used determines an individual's nutritional status (Mbhatani *et al.*, 2017). So, choosing healthy dietary habits may improves child's wellbeing and learning ability (Kris-Etherton, 2004) and also prevents health consequences like malnutrition, growth retardation and scholastic backwardness (Shivaprakash and Joseph, 2014).

Several studies have documented that developmental change between 5 to 19 years is greatly influenced by diet,

immunity and environmental factors unlike growth pattern in first five years that is subjected to feeding practices, environment and healthcare than genetics. Face to face interactions are the most effective for developing children to learn and gain information regarding health and nutrition. So, nutrition education is the most effective strategy to prevent nutritional deficiencies and ensure that meals are balanced (Sati and Dahiya, 2012). Children's nutrition is indirectly improved by providing nutrition instruction to mothers and their offspring (Mitchell *et al.*, 2013).

When children's homes are conducive to healthy eating, they are better able to attain the nutrition knowledge they learn in school (Lee, 2009). Every school's curriculum has to incorporate lessons on nutrition. It is crucial for children to understand "what to eat and why" as part of their education (Ruzita, *et al.* 2007). Schools are the best sites to teach students about nutrition but local governments and organizations for health professionals may also play a significant role in educating parents and children about nutrition (Khambalia *et al.*, 2012; Black *et al.*, 2008). Therefore, a complete refurbishment of the public administration and service delivery systems, as well as community participation is required to combat undernutrition among school going children. In view of above, the present study was planned to disseminate complementary education to primary school children for nutrition awareness.

MATERIALS AND METHODS

The present study was conducted in government schools of Ludhiana city of the Punjab state. Three primary schools were selected for this study based on their diverse student populations and geographical locations within the city. The schools were chosen to ensure a representative sample of students from different socio-economic backgrounds and educational levels.

The school children aged between 7 to 10 years were selected from government schools using purposive sampling. The sample size was 250 children aged between 7 to 10 years. The total subjects were divided into two groups having equal number of girls and boys. These two groups were further divided into 4 subgroups according to age such as 7 to <8 years, 8 to <9 years, 9 to <10 years and 10 years. The data were collected using pre-tested questionnaire through personal interview while taking help of the mothers of subjects enrolled in the study.

Demographic profile

Information about age, education, type of house, type of family, family composition, educational and occupational status of parents and total monthly income of the family were collected using pretested interview schedule. Modified Kuppuswamy's socio economic status scale was used to know the socio economic class of the subjects (Wani, 2019). Modified Kuppuswamy's socio economic status scale has given five classes of socio economic status such as upper class, upper middle class, lower middle class,

upper lower class and lower class with total score 26-29, 16-25, 11-15, 5-10 and below 5, respectively.

Morbidity pattern

Anaemia and other diseases such as skin diseases, dental caries, eye and ear diseases were diagnosed through observation of clinical symptoms. The clinical symptoms related to hair, eyes, mouth, tongue, skin and nails were recorded using standard procedures (Maqbool *et al.*, 2008). The information regarding deworming and immunization record was being collected.

Personal hygiene and sanitation

The data regarding personal hygiene habits including mouth and hand wash, cutting of nails, combing of hair, cleaning of teeth, bath in summer and winter, head bath and change of clothes among children were collected.

Development of complementary education module

The module was developed to cover basic concepts related to food, nutrition and health such as food groups, nutritional importance of each group and the roles of nutrients, balanced diet, anaemia, food and water hygiene, personal hygiene and school and environmental sanitation for imparting nutrition education to school children and their mothers. Information about dietary habits and low cost healthy snacks were being covered. Poems and songs regarding the importance of each food group were prepared for children to enhance their understanding of nutrition. These creative mediums not only engage children's imagination but also help them to develop a positive attitude towards eating a variety of foods. By incorporating catchy tunes and rhymes, these poems and songs make learning about balanced diets enjoyable and memorable for children, setting the foundation for a lifetime of healthy eating habits. A small video clip was also prepared on different topics such as balanced diet, hygiene, sanitation, etc. These clips were designed to provide quick and informative tips to children in an engaging manner. Pamphlets including all the information in brief were also prepared.

A Punjabi interview schedule was designed to assess the knowledge, attitude and practice scores of the chosen children pertaining to the aforementioned areas.

Complementary education dissemination

In order to assess the nutrition knowledge of the chosen school children and their mothers, the children were requested to participate in a pre-knowledge test. Nutrition education was delivered to a specific group of school children and their mothers through lectures supplemented with appropriate visual aids, method demonstrations and lecture-cum-discussion in small groups in the school premises. The topic covered during these sessions included anaemia, food hygiene, personal hygiene, environmental sanitation and the importance of balanced diet. Nutrition education was being imparted to the beneficiaries twice a week for one month.

After delivering the lecture, post-knowledge test was conducted in same way as pre-knowledge test. The developed module and pamphlets were also being distributed among subjects and their mothers.

Knowledge, attitude and practice

Pre and post-assessment of knowledge, attitude and practice were carried out. Gain in knowledge, quantum of improvement and percentage increase in score was calculated using the following equation:

Gain in knowledge = Score of post test - Score of pre test

$$\text{Quantum of improvement} = \frac{\text{Post-test score} - \text{Pre-test score}}{\text{Pre-test score}}$$

Per centage increase in score =

$$\frac{\text{Difference in post- and pre-test score}}{\text{Pre-test score}} \times 100$$

Statistical analysis

The data as collected from survey was analyzed using appropriate statistical tools. Mean and standard deviation were determined for each variable. An independent t-test was applied to test the difference between girls and boys.

RESULTS AND DISCUSSION

Background information

The participants were categorized into four age groups: 7 to <8 years, 8 to <9 years, 9 to <10 years and 10 years. In group I, there were a total of 33 individuals consisting of 22 girls and 11 boys (Table 1). The other groups had varying compositions: group II had 42 individuals with 20 girls and 22 boys; group III had 67 individuals with 34 girls and 33

boys and group IV had 108 individuals with 49 girls and 59 boys. However, Group IV exhibits the highest proportion of children, accounting for 43.2 per cent. Out of total subjects, 36.8 per cent were enrolled in the 4th standard, while the lowest per centage of students (6%) belonged to the 2nd standard. All of the children were following Hindu religion. Majority of students belong to nuclear families having 5 to 8 family members. According to the Census of India (2011), it was claimed that over half of the total population (52%) consisted of nuclear households. Chadda and Deb (2013) conducted a study on Indian family systems, focusing on the impact of collectivistic societal values on psychotherapy. Their findings revealed a noteworthy transformation in the evolving society, characterized by the dissolution of joint families and the emergence of nuclear family structures. Furthermore, it was noted that there existed an inverse relationship between the size of a family and the nutritional status of its members, with bigger families exhibiting poorer nutritional outcomes. In recent studies, Mukherjee and Chaturvedi (2017) found that a significant proportion of children, specifically 70.3 per cent resided in homes consisting of 4 to 5 members.

The educational status of parents revealed that majority of parents of both girls as well as boys was illiterate with per capita income range of Rs. 2000 to 4000. Likewise, Soni and Katoch (2014) found that over 50 per cent of the selected subjects were from families with a monthly income between Rs. 2000-4000. The socio-economic class of selected subjects was evaluated using a modified version of the Kuppuswamy scale in which education, occupation and per capita income were considered as major factors (Table 2). The findings revealed that a significant proportion

Table 1: Background information of the selected subjects.

Particulars	Girls (n=125)		Boys (n=125)		Total (N=250)	
	No.	%age	No.	%age	No.	%age
Age (years)						
7-<8	22	17.6	11	8.8	33	13.2
8-<9	20	16.0	22	17.6	42	16.8
9-<10	34	27.2	33	26.4	67	26.8
10	49	39.2	59	47.2	108	43.2
Class						
2 nd	7	5.6	8	6.4	15	6.0
3 rd	40	32.0	38	30.4	78	31.2
4 th	47	37.6	45	36.0	92	36.8
5 th	31	24.8	34	27.2	65	26.0
Religion						
Hindu	125	100	125	100	250	100
Type of family						
Nuclear	121	96.8	120	96.0	241	96.4
Joint	4	3.2	5	4.0	9	3.6
No. of family member						
Small (≤4)	26	20.8	37	29.6	63	25.2
Medium (5-8)	96	76.8	86	68.8	182	72.8
Large (>8)	3	2.4	2	1.6	5	2

of the selected girl's participants (76%) as well as boy's participants belonged to lower middle class.

Morbidity pattern

The study revealed the prevalence of clinical signs and symptoms associated with nutritional deficiency illnesses in both girls and boys (Table 3). Hair dyspigmentation was prevalent in both genders, with easy pluckability observed in 8.8 per cent of girls and 3.2 per cent of boys. Sharma and Sarlakhawat (2017) also found that 2.5 per cent of children had an easily pluckability due to low protein intake.

Night blindness was present in 0.8 per cent of the subjects, while pale conjunctiva of the eye was identified in 8.8 per cent of girls and 8.8 per cent of boys. Rajak, *et al.* (2018) also observed that 13.2 per cent of children exhibited pale conjunctiva. In recent study, it was observed that pale conjunctiva was found in 10.1 per cent of total subjects (Anga *et al.*, 2021).

Symptoms of spongy bleeding gums, mottled enamel, vitamin B insufficiency, angular stomatitis, cheilosis, pale and smooth tongue, pale skin and spoon-shaped nails were observed in 26.4 per cent of children. Hundred per cent immunization rate was observed in the selected

subjects. In Bareilly district, Mehrotra *et al.* (2011) documented that 65 per cent of the children experienced mild angular stomatitis, while 17.5 per cent had severe angular stomatitis and 4.5 per cent of the subjects experienced gum bleeding. In earlier study, researchers found that the level of pigmentation in the skin of children was only 25 per cent (Sharma and Sarlakhawat, 2017).

Personal hygiene and sanitation

The study also revealed variations in personal hygiene practices among children; the per centage of girls who washed their hands after using the toilet was found 96.8 per cent, while the corresponding per centage for boys was 99.2 per cent (Table 4). Similarly, Deb (2010) found that girls exhibited more hygienic practices in comparison to boys. A higher per centage of girls (92.6%) were observed to engage in regular hand washing after using the toilet in comparison to boys (73.8%).

Similarly, the per centage of girls who engaged in weekly nail trimming was 96.8 per cent, whereas for boys, it was 97.6 per cent. The children received regular instruction either at the morning assembly or within the classrooms. However, it was observed that a majority of

Table 2: Determinants of socio-economic status of the selected subjects.

Determinants	Girls (n=125)		Boys (n=125)		Total (N=250)	
	No.	%age	No.	%age	No.	%age
Father's education						
Illiterate	92	73.6	88	70.4	180	72.0
Primary	13	10.4	19	15.2	32	12.8
Matric and above	20	16.0	18	14.4	38	15.2
Mother's education						
Illiterate	100	80.0	105	84.0	205	82.0
Primary	8	6.4	13	10.4	21	8.4
Matric and above	17	13.6	7	5.6	24	9.6
Father's occupation						
Service	7	5.6	7	5.6	14	5.6
Labour	56	44.8	58	46.4	114	45.6
Guard /Driver/ Food delivery	56	44.8	56	44.8	112	44.8
Not Employed	6	4.8	4	3.2	10	4.0
Mother's occupation						
Service	1	0.8	3	2.4	4	1.6
Labour	89	71.2	98	78.4	187	74.8
Housewife	26	20.8	20	16.0	46	18.4
Tailor/Parlour	9	7.2	4	3.2	13	5.2
Total monthly income (Rs.)						
<10,000	4	3.2	4	3.2	8	3.2
10,000-20,000	91	72.8	87	69.6	178	71.2
20,000-30,000	28	22.4	33	26.4	61	24.4
>30,000	2	1.6	1	0.8	3	1.2
Per capita monthly income (Rs.)						
<2000	26	20.8	17	13.6	43	17.2
2000-4000	80	64.0	84	67.2	164	65.6
4000-6000	16	12.8	21	16.8	37	14.8
>6000	3	2.4	3	2.4	6	2.4

respondents (79.6%) engaged in daily hair combing, while a smaller proportion (20.4%) used to comb their hair twice a day. The study revealed that 91.2 per cent of boys and 73.6 per cent of girls used to brush their teeth once a day. While, 26.4 per cent of girls and 8.8 per cent of boys used to clean their teeth twice a day. In contrast, Haquet, *et. al.* (2014) found that 34.2 per cent of boys and 21.6 per cent of girls used to clean their teeth once a day. Additionally, 57.5 per cent of boys and 56.8 per cent of girls used to brush their teeth twice a day. One earlier study reported that 48 per cent of children used to comb their hair, 50 per cent used to clean their teeth, 84.6 per cent had the habit of washing hands before eating and 76.9 per cent used to trim their nails (Sarkar's, 2013).

In the summer season, 72.4 per cent of children had the habit of taking bath daily. The corresponding figure in winter was only 17.2 per cent. A majority of children (84.4%) engaged in the practice of changing their clothing once a day. Only 15.6 per cent preferred to change their cloth twice a day. Similarly, Ranga and Majra (2020) found that 80.3 per cent of subjects were changing their cloth once a day.

Knowledge, attitudes and practices

The distribution of the per centage of knowledge, attitudes and practices (KAP) scores acquired by a sample of girls from selected schools (Table 5). Regarding the acquisition of knowledge, it was found that a significant proportion of respondents (83.2%) achieved scores ranging from 20 to 40 per cent in the pre-test. Conversely, 16.8 per cent of

respondents obtained scores between 40 and 60 per cent. However, following the implementation of a nutrition education intervention, the post-test results indicated a shift in the distribution of scores. Specifically, the majority of respondents (80.8%) achieved marks ranging from 60 to 80 per cent. Additionally, 16 per cent of respondents attained scores between 80 and 100 per cent, while 3.2 per cent of respondents obtained marks between 40 and 60 per cent. In contrast, the data presented in Table 6 indicated that a significant proportion of boys (82.4%) obtained scores ranging from 20 to 40 per cent in the pre-test, while 17.6 per cent achieved scores between 40 and 60 per cent. However, the post-test results depicted that the majority of respondents (78.4%) achieved scores between 60 and 80 per cent. Additionally, 20 per cent of the participants obtained scores ranging from 80 to 100 per cent and 1.6 per cent scored between 40 and 60 per cent. This finding suggested a notable enhancement in the respondents' nutrition knowledge.

While considering attitude, it was observed that the majority of girls (88.8%) as well as boys (88%) achieved scores ranging from 40 to 60 per cent. Following the implementation of nutrition education, the score per centage of girls 4.8, 87.2 and 8.0 per cent lied between the score ranges of 20-40, 40-60 and 60-80 per cent, respectively, while among boys, the score per centages of 7.2, 88.8 and 4.0 per cent respectively.

Regarding practices, it was observed that during the pre-test, a significant proportion of girls (96.8%) achieved

Table 3: Prevalence of clinical signs among selected subjects.

Clinical signs	Girls (n=125)		Boys (n=125)		Total (N=250)	
	No.	%age	No.	%age	No.	%age
Hairs						
Dyspigmentation	9	7.2	4	3.2	13	5.2
Easy pluckability	11	8.8	4	3.2	15	6.0
Eyes						
Night blindness	1	0.8	1	0.8	2	0.8
Pale conjunctiva	10	8.0	11	8.8	21	8.4
Mouth						
Angular stomatitis	5	4.0	6	4.8	11	4.4
Cheilosis	10	8.0	10	8.0	20	8.0
Mottled enamel	32	25.6	38	30.4	70	28.0
Loose gums	2	1.6	6	4.8	8	3.2
Spongy bleeding gums	4	3.2	5	4.0	9	3.6
Tongue						
Pale and smooth tongue	10	8.0	9	7.2	19	7.6
Skin						
Pale skin	5	4.0	5	4.0	10	4.0
Pigmentation of skin	27	21.6	39	31.2	66	26.4
Nails						
Pale nails	5	4.0	4	3.2	9	3.6
Spoon nails	22	17.6	15	12.0	37	14.8
Immunization	125	100	125	100	250	100
Deworming	125	100	125	100	250	100

scores ranging from 20 to 40 per cent, while a smaller percentage (3.2%) obtained scores between 0 and 20 per cent. The results of the post-test assessment reported a notable enhancement in dietary behaviors. Specifically, a significant majority (98.4%) of girls achieved scores ranging from 20 to 40 per cent, while a small proportion (1.6%) of respondents obtained scores within the 40-60 per cent. Among boys, the results of the post-test assessment revealed that 97.6 per cent of the subjects achieved scores ranging from 20 to 40 per cent. While, 2.4 per cent obtained scores between 0 and 20 per cent.

The mean KAP scores obtained by girls and boys (Table 7). The average knowledge, attitude and practices

score was obtained as 6.5 ± 1.1 , 7.2 ± 1.0 and 3.9 ± 0.7 , respectively. The corresponding figures after post-test were recorded as 18.8 ± 0.8 , 9.9 ± 0.1 and 5.8 ± 0.7 , respectively. Among boys, the average knowledge, attitude and practices score was obtained as 6.6 ± 0.9 , 6.9 ± 0.9 and 3.9 ± 0.5 , respectively. After post-test, the corresponding figures increased to 18.6 ± 1.1 , 8.9 ± 0.1 and 5.7 ± 0.9 , respectively. It was interpreted that both girls (65.4%) and boys (64.5%) exhibited more than 60 per cent increase in their knowledge scores. Keshani, *et. al.* (2016) studied that planned nutrition education program could increase nutrition knowledge of the subjects.

Table 4: Personal hygiene habits among selected subjects.

Personal hygiene habits	Girls (n=125)		Boys (n=125)		Total (N=250)	
	No.	%age	No.	%age	No.	%age
Hand wash						
Yes	121	96.8	124	99.2	245	98.0
Mouth and hand wash						
Before meal	114	91.2	121	96.8	235	94.0
After meal	11	8.8	4	3.2	15	6.0
Cutting of nails						
Weekly	121	96.8	122	97.6	243	97.2
Whenever	4	3.2	3	2.4	7	2.8
Combing of hair						
Once in a day	82	65.6	117	93.6	199	79.6
Twice in a day	43	34.4	8	6.4	51	20.4
Cleaning of teeth						
Once in a day	92	73.6	114	91.2	206	82.4
Twice in a day	33	26.4	11	8.8	44	17.6
Bath in summer						
Once in a day	89	71.2	92	73.6	181	72.4
Twice in a day	36	28.8	33	26.4	69	27.6
Bath in winter						
Once in a day	20	16.0	23	18.4	43	17.2
Once in two days	91	72.8	82	65.6	173	69.2
Weekly	14	11.2	20	16.0	34	13.6
Head bath						
Daily	18	14.4	117	93.6	135	54.0
Weekly	107	85.6	8	6.4	115	46.0
Change of clothes						
Once in a day	98	78.4	113	90.4	211	84.4
Twice a day	27	21.6	12	9.6	39	15.6

Table 5: Distribution of per centage knowledge, attitude and practices scores for the selected subjects (Girls, n=125).

Scores (%)	Knowledge				Attitude				Practices			
	Pre test		Post test		Pre test		Post test		Pre test		Post test	
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
<20	-	-	-	-	-	-	-	-	4	3.2	-	-
20-40	104	83.2	-	-	8	6.4	6	4.8	121	96.8	123	98.4
40-60	21	16.8	4	3.2	111	88.8	109	87.2	-	-	2	1.6
60-80	-	-	101	80.8	6	4.8	10	8	-	-	-	-
80-100	-	-	20	16	-	-	-	-	-	-	-	-

Table 6: Distribution of per centage knowledge, attitude and practices scores for the selected subjects (Boys, n=125).

Scores (%)	Knowledge				Attitude				Practices			
	Pre test		Post test		Pre test		Post test		Pre test		Post test	
	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age	No.	%age
<20	-	-	-	-	-	-	-	-	6	4.8	3	2.4
20-40	103	82.4	-	-	10	8	9	7.2	119	95.2	122	97.6
40-60	22	17.6	2	1.6	110	88	111	88.8	-	-	-	-
60-80	-	-	98	78.4	5	4	5	4	-	-	-	-
80-100	-	-	25	20	-	-	-	-	-	-	-	-

Table 7: Mean KAP scores obtained by selected subjects.

Test	Knowledge		Attitude		Practices	
	Mean±SD		Mean±SD		Mean±SD	
	Girls	Boys	Girls	Boys	Girls	Boys
Pre test	6.5±1.1	6.6±0.9	7.2±1.0	6.9±0.9	3.9±0.7	3.9±0.5
Post test	18.8±0.8	18.6±1.1	9.9±0.1	8.9±0.1	5.8±0.7	5.7±0.9
Gain in scores	12.3	12	2.7	2	1.9	1.8
Quantum of improvement	2.9	2.8	1.4	1.3	1.5	1.5
Per centage increase in score	65.4	64.5	27.3	22.4	32.7	31.6

CONCLUSION

The study concluded that majority of the subjects *i.e.*, 43.2 per cent were 10 years of age with 39.2 per cent girls and 47.2 per cent boys. A total of 76 per cent of girls and 71.2 per cent of boys belonged to the lower middle class. The study also revealed variations in personal hygiene practices among children, with a majority engaging in daily hair combing and washing their teeth. The study revealed the prevalence of clinical signs and symptoms associated with nutritional deficiency illnesses in both girls and boys. The study concluded that after implementing a nutrition education intervention, the majority (80.8%) achieved KAP scores between 60-80 per cent. This indicated a notable enhancement in the respondents' understanding of nutrition. There was almost 65 per cent increase in the scores obtained by both girls and boys after nutrition education dissemination.

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Conflict of interest

All authors declared that there is no conflict of interest.

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