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RESEARCH ARTICLE

IMPROVEMENT IN CHILDCARE HEALTH VIA MEDICAL EXPANSION?A RANDOMIZED CONTROL TRIAL

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Abstract

Medical expansion has become a dynamic in India and that is required to control the increased health illness and other human problems. Medical expansion must be multidimensional and include two health care systems:- increasing medical investment and medical professionalization. We find medical investment and medial professionalization significantly improve a wide range of outcomes, including life expectancy and decreased mortality rate in children. We also found that medical expansion is negatively associated with childhood obesity and socio economic conditions are positively associated with the childcare health.

Introduction:-

Medical expansion includes the health care system, i.e. increasing medical investment and increasing medical professionalization, which are supposed to decrease the incidence of health illness and disease related human problems (Conrad et al 2005). As per the biomedical model of health and illness, health problems are due to failures in biology, hygiene, behaviour, and biomedical treatment delivered to individuals by physicians(Conrad et al 2002).. The above biomedical model resulted in the expansion of the medical field in the last 50 years. From 6-7 years ago, dozens of state medical colleges were established in India with the recruitment of medical professionals to provide the best primary to tertiary healthcare to humans, resulting in a significant medical expansion.

Some examples of this medical expansion come from the United States also where total health expenditures as a percentage of gross domestic product (GDP) increased from 5.1% in 1960 to 17.1% in 2014; Australia, where medical workforce employment increased from 12.5 per 1,000 persons in 1960 to 36.7 per 1,000 persons in 2006; the United Kingdom, where the number of doctors increased from .8 per 1,000 persons in 1960 to 2.7 per 1,000persons in 2009; and Switzerland, where the number of medical specialists increased from 0.5 per 1,000 persons in 1960 to 2.7 per 1,000 persons in 2006 (Organization for Economic and Co-operation and Development 2014) (Wang et al 2015).

But the question here is how much this massive medical expansion has benefited human health in developing countries like India. Whether this massive medical expansion has had a positive impact on newborn life expectancy or child care by education parents medical expansion, the socio-economical development of humans plays an important role in childcare health (Crowley et al 2009). With this motive, the present randomised control was

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planned to investigate the effect of medical expansion on childcare health. Tones of studies on the association between medical expansion and socioeconomics with mortality are present, but to our knowledge, this is the first study to examine the relationship between socioeconomic development and medical expansion on childcare with an age range of 0–4 years.

Material And Methods:-

A one-year (2018– 2019) randomised control trial (RCT) was conducted by the 139 childcare providers, i.e. well-trained nurses, MBBS doctors, and MBBS plus MD doctors of the paediatric department in four private medical colleges and two government medical colleges in the Bareilly region of Uttar Pradesh, India. Five hundred sixty children were selected for this trial from 13 child care centres (public health care centres). These selected children belong to 523 families.

The Institutional Ethics Review Board on Human Subject Research at Rajshree medical research institute, Bareilly Uttar Pradesh, India has reviewed and approved the protocol. Parents and child care providers' consent forms were approved by the local ethical committee on July 25th, 2018 and, as per the study design, the online and offline workshops were conducted from July 26th, 2018 to July 25th, 2019 at nine public health care centres and their respective centre directors were duly informed. Parents willing to participate have provided a written, informed consent form and parents have requested to attend all the online and offline workshops throughout the year. For the online and offline workshops, the parents were informed three days prior by telephony or SMS. Their presence was mandatory, otherwise they would be excluded from the study (Erinosho et al 2011).

Inclusive criteria for the public health care centres require local language speaking childcare providers, an on-site kitchen, racial/ethnic diversity among the children, and a population of children in care primarily comprised of low-income children between the ages of zero to four years of age(Hanna et al 2012). Exclusion criteria for enrolling children included chronic illnesses or conditions that affected nutritional status, severe food allergies, gastrointestinal disorders, or mobility impairment. Each of the centres received 500/ per child for its participation in the study (Hanna et al 2012). The intervention centre directors were asked to purchase the required stationary and necessary arrangements for the workshop, and were also directed to supply the equipment to support physical activity that will be taught by child care providers to the parents during the offline workshop. This was done as per the guide lines of American Academy of Pediatries.

The total number of selected children has been divided into 2 categories/ groups. The first group belongs to the intervention group and the second group belongs to the control group. The selected children understudy were allocated into the groups by a computer based random selection process. The children with disabilities were also selected because of the accident. Children with inborn errors of metabolism or with primary immunodeficiency were excluded from the study(Isbell et al 2013).

The child care providers organised workshops on (1) childhood obesity, (2) healthy eating for young children, (3) physical activity for young children, (4) personal health and wellness; and (5) working with families to promote healthy behaviours at each of the intervention centres. In addition, the child care providers worked with the centre directors to write or update the centre's nutrition and physical activity policies (Isbell et al 2013). They also provided at least monthly on-site consultations and additional phone or email consultations, and distributed posters and information sheets on nutrition and physical activity. The posters were displayed in the child care centres, and the information sheets were given to the child care providers and parents. Some common issues related to mild serving and ideas for structured physical activity were discussed with the centre directors of the public health care centre.

Child care providers, with the help of the centre director, filled in the questionnaires and consent forms from the parents. Data collection occurred at baseline and after one year post-intervention at all centres. One additional research assistant was trained to make measures of nutritional intake and physical activity based on observations of individual children in all centres(Benjamin et al 2012 & Brown et al 2006).

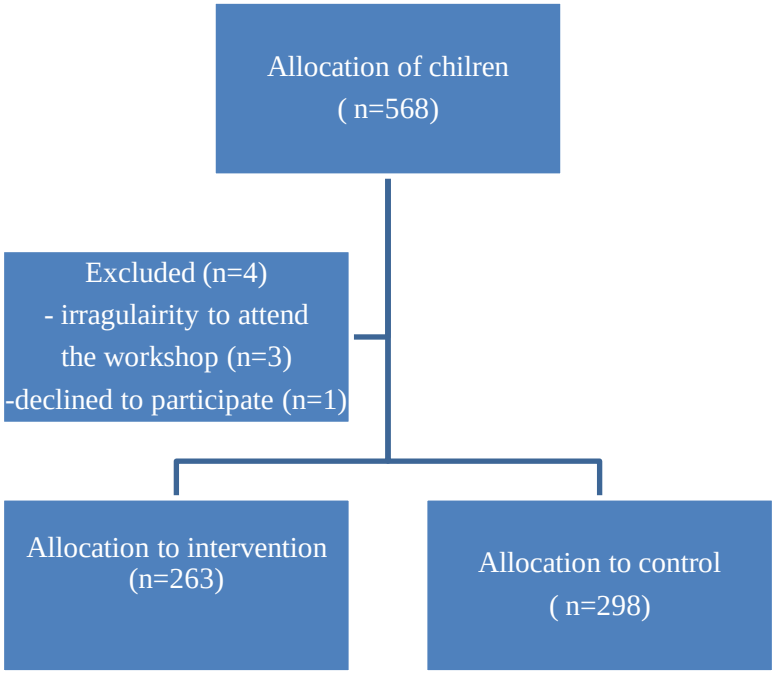
To increase the knowledge of patents, 250 workshops were conducted over one year by childcare providers (i.e., freshly recruited, well-trained nurses, MBBS and MS/MD doctors) on topics related to childhood illness, obesity, healthy eating, physical activity, vaccine program, sukanyayojna and raising healthy kids. These 250 workshops were conducted at government-decided public health care centres adopted by private four medical colleges in the

Bareilly, Uttar Pradesh region and two government medical colleges, i.e., Badau and Sahjahapur, Uttarparadesh. Childcare providers conducted six onside visits and five office consultations per centre over one year, in addition to parent workshops.

Statistical Analysis:-

To compare the baseline demographic characteristics, T-tests or chi-square tests were conducted between the intervention and control centres. To compare the pre-intervention center-level nutrition and physical activity policies, observations between the intervention and control centres were used independent sample T-tests. T-tests were conducted for continuous variables and chi-square tests for categorical variables. There was missing data for some demographic variables. *$p<0.05$ was found to be significant.

Figure 1:- Randomization chart.



Results:-

A total of 564 children aged 0–4 years were included in the study.

In the interventional group, 54% of male children were selected with a mean age of 2.17±1.47 years, and in the control group, 52% of male children were selected with a mean age of 2.04±1.32 years. Three and one handicapped child were selected in the intervention and control groups respectively.

The interventional and control group demographic data were significantly different in respect of selected children and families included in the study, as shown in tables 1 & 2 by religion (chi-square (df) = 244.54(4), $p<0.0001$), parent education (chi-square (df) = 26.85(1), $p< 0.0001$) and family income (chi-square (df) = 23.54(2), $p<0.0001$). At the center-level, parent education (t statistic (df) = 2.68(15), $p = 0.02$) and family income (t statistic(df) = −2.54(15),$p = 0.02$) were significantly different between the intervention and control centres.

No significant differences were found among the groups in the education of child care providers, and a significant difference was found in the religions ($p<0.05$) of childcare care providers among the groups, i.e. interventional and control groups. According to the topics discussed in the workshops, a significant difference in patent knowledge was found after preworkshop and postworkshop, as shown in table 3 & 4, such as childhood illness (t= 3.74(4), F= 14.41 (1,4), P=0.02), childhood obesity (t= 7.03(4), F= 47.62 (1,4), P=0.00), healthy eating (t= 0.86(4), F= 0.64(1,4), P=0.03), physical eating (t= 3.08(4), F= 8.61 No significant change has been observed in healthy eating either in interventional or in control group selected children.

As per table number 5, among all children (in both the groups) measured at the pre-intervention period, there were no significant differences in the intervention versus control centres in the percent of children in the underweight, overweight, or obese categories. And after one year, there was no significant difference between the interventional and control group children in the p values in relation to the children that were underweight, overweight, and obese.

Table 1:- Characteristics of child included in the study.

		Intervention (n= 266)	Control (n= 298)
1	Age (0-4 years)	263	297
2	Sex M/F ($\%^{age}$)	144/122 (54/46)	156/142 (52/48)
3	Handicap ($\%^{age}$)8*	03 (1.12)	01 (0.3)
4	Inborn error of metabolism	00	00

Note T-tests were conducted for continuous variables and chi-square tests forcategorical variables. There were missing data for some demographic variables. *p < 0.05 was found significant.

Table 2:- Characteristics of family included in the study.

			Intervention (n= 250) N ($\%^{age}$)	**Control (n= 273) N ($\%^{age}$)**
1	**Religion**	Hindu	141(54)	120(43.9)
		Muslim	92(36.8)	132(48.3)
		Sikh	15(6)	16(5.8)
		Other	02(0.8)	05(1.8)
		Total	250	273
2	**Education**	Less than 10^{th} class	121(48.4)	134(49.0)
		Bachelor	129(51.6)	139(50.9)
3	**Employment status**	Full time worker	97(38.8)	102(37.3)
		Part time worker	112(44.8)	115(42.1)
		Other	41(16.4)	56(20.5)
4	**Government subsides holder**	Receive any subsides for family	134(53.6)	157(57.5)
		Medical insurance for family	154(61.6)	121(44.3)
		Housing	23(9.2)	15(5.4)
		Child support	46(18.4)	43(15.7)
		Sukanya yojna	112(44.8)	135(49.4)
		Other	4(1.6)	7(2.5)
5	**Income status**	Below 3000 per month	188(75.2)	201(73.6)
		Below 10000 per month	62(24.8)	72(26.3)

Note T-tests were conducted for continuous variables and chi-square tests forcategorical variables. There were missing data for some demographic variables. *p < 0.05 was found significant.

Table 3:- Characteristics of child care providers in the study.

1	**Religion**		**Intervention (n= 78)**	**Control (n= 61)**
		Hindu	32	`25
		Muslim	34	32
		Sikh	10	4
		Other	2	0
2	**Education**	MBBS	23	23
		MBBS & MD/MS	6	6
		BSc Nursing	49	32

Note T-tests were conducted for continuous variables and chi-square tests forcategorical variables. There were missing data for some demographic variables. *p < 0.05 was found significant.

Table 4:- Results of pre and post workshop knowledge questionnaires of parents based on government directed programs for child care (child care centres N =13).

Sl	Workshop topics	Pre-workshop mean (SD) range 0-10	Post-workshop mean (SD) range 0-10	t-statistic (df)	F-statistic (df)	p-value
1	Childhood illness	6.07	7.35	3.74(4)	14.41(1,4)	0.02
2	Childhood obesity	5.12	9.07	7.03(4)	47.62(1,4)	0.00
3	Healthy eating	7.32	7.62	0.86(4)	0.64(1,4)	0.42
4	Physical activity	6.87	9.83	3.08(4)	8.61(1,4)	0.03
5	Vaccine program	8.8	9.57	4.33(4)	11.67(1,4)	0.03
6	Sukanya yojna	9.45	9.41	4.62(4)	11.82(1,4)	0.03
7	Raising healthy kids	6.4	8.67	3.41(4)	21.32(1,4)	0.04

Note *p < 0.05 was found significant.

Table 5:- Effect of workshops conducted by health care professionals on selected population and their Frequency distribution among the child-level Body mass index category.

		Intervention (N=263)				Control (N=298)		
Sl		Preintervention	Post intervention	P-value	Sl	Preintervention	Post intervention	P-value
1	**Under weight**	112(42.5)	107(40.6)	0.56	1	129(43.2)	124(41.6)	0.55
2	**Overweight**	42(15.9)	46(17.4)	0.53	2	57(19.1)	55(18.4)	0.58
3	**Obese**	9(3.4)	5(1.9)	0.22	3	3(1.0)	4(1.3)	0.75

Note *p < 0.05 was found significant.

Discussion:-

The current study aimed to link medical expansion and childcare by educating parents through workshops led by childcare providers, such as well-trained nurses and doctors. This study was done because socio economical factors also play an important role in childcare. McKeown's thesis states that socio economical conditions remain strongly associated with population health, and it has also been noticed that societal level indicators of social conditions are fundamental causes of disease at all stages of development (Colgrove et al 2002). So we planned to educate parents with medical professionals from medical colleges. The government of India is spending money on the recruitment of medical professionals, but it is unclear whether this medical expansion has a positive effect on the medical expansion. With regard to medical investment, numerous studies report that the health of the American population is worse than that of the populations of other affluent democracies, despite the fact that the percentage of GDP spent on healthcare in the United States is essentially double that spent in those countries (Nixon et al 2006). And many researchers claim that the ever-increasing percentage of GDP spent on healthcare cannot be sustained in the future.

This randomised control trial showed that a one-year workshop programme increased parent knowledge in the interventional group in relation to childhood illness, obesity, healthy eating, physical activity, vaccine programme, and Sukanya yojna as compared to the control group. Our study has similar results to research done by Herman A et al. (2012) where increased children's physical activity and decreased sedentary behaviour were absent. It has been shown that childcare policies on physical activity can have an impact on vigorous physical activity in preschool-aged children (Copeland K et al. 2011 & 2012 and Lidegaard et al 2020). The magnitude of the effect of the workshop on curing underweight, overweight, and obese children was not found to be significant. State child care regulations and national child care programmes were needed to ensure the engagement of children in physical activity. When the two groups were compared, we found a significant positive change in the healthy food category but no significant positive change in the illness and underweight, overweight, or obese categories.

In a randomized control trial of high risk preschool-age children, a six-month family intervention of weekly parent and child groups for families with preschool-age children showed that children in the intervention group had lower BMIs and consumed fewer calories from carbohydrates compared to the control group (Copeland K et al. 2011& Reilly et al 2010). A quasi-experimental study of a center-based physical activity intervention for primarily Mexican-American children attending Head Start programs showed that children in the intervention groups

consumed more fruits, vegetables, and low-fat milk (Yin Z et al. 2012&Vernarelli et al 2011). On the other hand, a randomized control trial of a teacher-based weight control intervention for African American preschool children in child care centers found only one significant, positive change in dietary intake (percent of calories from saturated fat) for the intervention versus control centres (Fitzgibbon et al., 2005).

Now in India, the child care centres were planned and reconstructed similar to the rules and regulations followed by North Carolina, Oklahoma and New York city child care centres where fruits, non-fried vegetables, whole grains, and low-fat milk were offered to children (Sisson et al 2012). Our study has similar findings to Bower J et al. (2008), where it was found that children were sedentary 55-80% of the time. As per Bower et al., the percentage of preschool children engaged in physical activity was only 3–12% of the time. Physical activity is a must to overcome diseases like obesity, underweight, and overweight (Wang et al 2015).

Healthy eating and physical activity have a direct relationship, but a one-year workshop/ programme can not force the parents to increase the physical activity of their children (Larson et al 2011& Natale et al 2013). It can only educate the parents. Improvement in the childcare programme at socioeconomic level is required to increase the physical activity of children and awareness to eat healthy food (Link et al 2002, Koester et al 2021 & Halaby et al 2004).

The major limitation of our workshop was that it has limited input on parents' nutrition and physical activity at home, and we need more child level data and to conduct more surveys at childcare centres to get a final analysis. With this analysis, we concluded that the government is spending money on childcare health by conducting various programs and workshops, but socio economical factors are playing a negative role in childcare health.

Despite concerns about the sustainability of healthcare expenditures in the United States or any other developed country, our findings indicate that medical investment is a significant positive predictor of population health. But improvement in the socioeconomic status of the population is required (Zamora et al 2019). Our findings also suggest that the dimension of medical expansion has a negative relationship with childcare health. Additional research is needed to understand the reasons for this apparent discrepancy.

In conclusion, Thisstudy suggests that medical expansion has both positive and negative relationships with population health. Social and economic factors continue to be critically important for population health; their significance for population health has not been studied. But medical expansion, especially healthcare spending and professionalization/specialization of healthcare providers, also has an ambiguous role in child health.

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