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Impact of counseling and reinforcement by school teachers on behavior change in children: A one -year follow-up study

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Abstract:

INTRODUCTION: School teachers play an important role in instilling positive behavior changes among school children. School children at an early age group of 2–7 years face challenges and need extra support. Utilization of psychological interventions via school teachers for oral health promotion is minimal. The present study was done to determine the impact of counseling and reinforcement by school teachers on children for a follow-up period of 1 year.

MATERIALS AND METHODS: A quantitative research on 58 randomly selected children for a follow-up of one year was conducted to determine the prevalence of preoperational characteristics in school children. The tools to determine characters in preoperational children consisted of classical cognitive experiments followed by behavior counseling intervention. The interventional group received reinforcement with school teachers for a follow-up of one year.

RESULTS: The assessment of the three characteristics revealed a prevalence of ego centralism, centration, and lack of conservation and reversibility in 84.4%, 89.6%, and 89.6% children, respectively. A significant difference in behavior change was seen in children who received behavior counseling and reinforcement.

CONCLUSION: The present study concluded that Piaget's characteristics were consistent for a follow-up period of one year.

Keywords:

Behavior change, health education, health promotion

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Introduction

Cognition refers to the mental process of knowing, including aspects such as awareness, perception, reasoning, and judgment.^[1] Swiss psychologist Jean Piaget (1896–1980) was a pioneer who put forward the most influential theory of cognitive development. Piaget observed a difference between the answering ability of questions by children different from the older due to a difference in thinking. The answers were not based on the child's level

of intelligence; however, on the child's stage of development. Piaget believed that children formulate and construct a different understanding of the world around them, experience discrepancies between what they already know and discover in their environment.^[2] Piaget's work received greater attention worldwide, even the child-centered classrooms and open education are direct applications of Piaget's views.^[3]

Piaget stated the existence of an upward expanding spiral in children in context to intellectual development in which children

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must constantly reconstruct the ideas formed at earlier levels with the new, higher-order concepts acquired at the next level.

Piaget believed that children go through four universal stages of cognitive development sensorimotor stage, preoperational stage, concrete operational stage, and formal operational stage. According to Piaget, the children in preoperational stage (2–7 years), the stage at which children enter school are unable to take others perspective (egocentric). They are not able to concentrate on different events (centration) and are unable to reverse the sequence of events (lack of conservation and reversibility).^[4]

School children at an early age group of 2–7 years face challenges and need extra support, additional services, and added guidance to meet academic, social, emotional, and sometimes medical milestones. Early intervention is an important step toward helping the child fulfill his or her full academic, emotional, and social potential. Intervening at an early stage can aid in the assimilation of health and particularly oral health promotion practices as activities like tooth brushing are routinely practiced by children. Early intervention of oral hygiene characteristics can significantly reduce the burden of oral diseases and relieve stress from the children and caregivers.

One of the key aspects of incorporating oral hygiene practices at an early age is understanding the child psychology and designing interventional strategies which assimilate the behavior changes. A study conducted by Wide *et al.*^[5] reported a positive effect of psychological intervention in improving oral health behaviors. Werner *et al.*,^[6] in their systematic review on psychological interventions for poor oral health reported significant differences in favor of psychological interventions in oral health behavior and self-efficacy in tooth brushing.

However, there exist lacunae in literature in the utilization of psychological interventions for oral health promotion in Indian scenario and, in particular, for one of the most important theories of cognitive development - Piaget's cognitive theory. This theory has been widely accepted and utilized as a teaching aid for enhancing child development. No study in the past has taken into consideration Piaget's cognitive theory in improving the oral health of children. A prerequisite before intervention; however, was the determination of the preoperational characteristics in the school children.

Hence, the current study was aimed to assess the cognitive behavior and impact of counseling and

reinforcement by school teachers on preoperational children for a follow-up period of 1 year.

Materials and Methods

Study design, study setting, and study population

A quantitative research on 58 school children evaluated the effect of counseling intervention by principle investigator and reinforcement by teachers.

Parents were informed about the nature of the study and a written informed consent was obtained from parents prior to the start of the study. Permission to conduct the study on school premises was taken from the school authorities. School children in the age group 4–7 years capable of cooperating with the study protocol and willing to participate in the study were included. The selection of age 4 years instead of 2 was based on the admission of children at 4 years. Children with manual dexterity and whose parents did not provide any written informed consent were excluded from the study.

Sample and sampling

A pilot study was carried out among 20 school children from different schools, 5 from each age group of 4–7 years to determine the sample size and feasibility of the study, the results of which are not included in the final study. The sample size estimation for was done using G power software, (Information Technology Services, UNC Greensboro) and the estimated sample size was found to be 58 school children.

Two schools were randomly selected and assessment of ego centralism, centration, and lack of conservation and reversibility among children was performed through classical three mountain experiments, toothpaste experiment (based on the concept of cardinal number), and classical beaker experiment. The assessment was subsequently followed by behavior counseling intervention and reinforcement by school teachers in one school (intervention group) whereas children from other were restrained from the counseling (control group). The follow-up evaluation was carried out after 1 month, 6 months, and 1 year.

Ethical permissions and consent

The study proposal was approved by Institutional Review Board and ethical clearance was obtained from the Institutional Review Committee of Sri Aurobindo College of Dentistry Indore.

Study tools

The validity and reliability of the audiovisual aid were tested and an audiovisual aid in Hindi consisting of modules on brushing technique and oral hygiene instructions was demonstrated to the children followed

by live demonstrations of modules by a trained and calibrated dentist. Trained dentist subsequently followed by the assessment of three psychosocial characteristics, i.e. ego centralism, centration, conservation, and reversibility. Different oral hygiene aids such as toothbrushes, toothpastes, mouthwashes, dental floss, previously demonstrated in the audiovisual aid were used as armamentarium during experiments and assessment.

Egocentrism

Egocentrism is the inability to take another person's perspective or point of view.^[1] It is the assumption that others view the world as one does oneself.^[7] It is not indicative of the fact that child is selfish; rather, the child lacks the ability to consider another person's point of view. The assessment of ego centralism was done by the classical three mountains experiment as explained by Piaget. The child was seated on one side of the table; three paper made mountains of varying sizes were placed on the table. Different oral hygiene aids were placed on the same end and other ends of the table. The child was first asked to explain his view and then the investigator's view. An egocentric child often again picks their own view (when asked about the investigator view) rather than investigator's view as she/he is unable to understand another person's perspective.

Centration

Centration is the tendency to focus, or center, on only one aspect of a situation and ignore other aspects of the situation.^[1] The focus is on the most striking or compelling aspect of the situation. To assess the concept of cardinal numbers, the toothpaste experiment was used. The child, on seeing two rows of an equal number of toothpastes answered whether both the rows had equal number of toothpastes. The second row of toothpastes was then spread out a little and the child was asked the same question again. The child with the concept of centration pointed out that the spread out row had more number of toothbrushes.

Lack of conservation and reversibility

The principle of conservation states that two equal physical quantities remain equal even if the appearance of one is changed, as long as nothing is added or subtracted.^[1] The assessment of conservation task was based on the classical beaker experiment. The child was presented with two identical beakers containing the same amount of colored mouthwash; the mouthwash from one beaker was poured into a third taller and thinner beaker. The child was asked to identify the beaker that contained more liquid/mouthwash. If the child pointed out taller beaker as the one containing more liquid/mouthwash, she/he was marked lack the concept of conservation. This mark was indicative that the child is not able to

cognitively reverse the series of events. The child fails to understand that two amounts of liquid/mouthwashes are still the same sue to concept of irreversibility.

Behavioral counseling

Early intervention after live demonstration and assessment was provided in the form of behavior counseling. The behavior counseling incorporated components of cognitive behavior theory and modules of oral hygiene behavior and brushing technique. The counseling assimilated the psychological concepts in public health dentistry.

Reinforcement

Postcounseling of children, training of school teachers was conducted, and they were also provided with written content to reinforce the counseling intervention. Children from one school were reinforced with behavior counseling whereas children from the other school were restrained from reinforcement. A daily reminder to intervene the behavior counseling for the stipulated time through text messages and calls during school hours was provided to the school teachers. The follow-up assessment was done after 1 month, 6 months and 1 year.

The evaluation of interventional behavior counseling and reinforcement was done using the same preinterventional experiments to determine the ego centralism, centration, lack of conservation, and reversibility. Experiments were modified only with respect to oral hygiene aids and armamentarium to avoid misleading results due to memory recall rather behaviour change. The evaluation of brushing demonstration was done by a trained dentist blinded to results of preassessment and study participants. A positive change in at least two characteristics with the ability to demonstrate the correct brushing technique was classified as behavior change.

Analysis

Data collected was entered into Microsoft excel and was analyzed using Statistical Package for Social Sciences (SPSS) version 20.0. Chi-square test was employed to determine the statistical significance.

Results

Twenty-nine male and 29 female children were included in the present study [Table 1]. An assessment of the prevalence of the three characteristics in children revealed a decrease in the prevalence of the three characteristics after behavior counseling and reinforcement post 1 month; however, a follow-up analysis after 1 year revealed an increase in the prevalence [Table 2]. A comparative evaluation of the oral health behavior in reinforced and nonreinforced group revealed a

significant change in the reinforced group for all the time intervals [Table 3].

Discussion

Jean Piaget (1896–1980)^[8] became intrigued with reasons children gave for their wrong answers to the questions that required logical thinking. He believed that these incorrect answers revealed important differences between the thinking of adults and children.

Piaget did not want to measure how well children could count, spell or solve problems as a way of grading their intelligence quotient, he was more interested in way in which fundamental concepts such as the very idea of number, time, quantity, causality, justice, and so on emerged. Piaget (1936) was the first psychologist to make a systematic study of cognitive development. His contributions include a theory of child cognitive development, detailed observational studies of cognition in children, and a series of simple but ingenious tests to reveal different cognitive abilities. Before Piaget’s work, the common assumption was that children are merely less competent thinkers than adults. Piaget showed that young children think in strikingly different ways compared to adults. According to Piaget, cognitive development was a progressive reorganization

of mental processes as a result of biological maturation and environmental experience. Children construct an understanding of the world around them, experience discrepancies between what they already know and what they discover in their environment. The three basic components to Piaget’s Cognitive theory include schemas (building blocks of knowledge), adaptation processes that enable the transition from one stage to another (equilibrium, assimilation, and accommodation) and stages of development, i.e. sensorimotor, preoperational, concrete operational, and formal operational. When Piaget talked about the development of a person’s mental processes, he was referring to increases in the number and complexity of the schemata that a person had learned. When a child’s existing schemas are capable of explaining what it can perceive around it, it is said to be in a state of equilibrium, i.e. a state of cognitive (i.e. mental) balance. Piaget emphasized the importance of schemas in cognitive development and described how they were developed or acquired. The assumption is that we store these mental representations and apply them when needed. He described how – as a child gets older – his or her schemas become more numerous and elaborate. Piaget believed that newborn babies have a small number of innate schemas – even before they have had many opportunities to experience the world. These neonatal schemas are the cognitive structures underlying innate reflexes.

Table 1: Sociodemographic characteristics of the preoperational children

Gender	Age			
	4 years, n (%)	5 years, n (%)	6 years, n (%)	7 years, n (%)
Male	6 (46.2)	8 (53.3)	7 (46.7)	8 (53.3)
Female	7 (53.8)	7 (46.7)	8 (53.3)	7 (46.7)
Total	13 (100)	15 (100)	15 (100)	15 (100)

Table 2: Prevalence of ego centrism, centration, and lack of conservation and reversibility at different time intervals in school children

Characteristics	Ego centrism, n (%)	Centration, n (%)	Lack of conservation and reversibility, n (%)
Preintervention	49 (84.4)	52 (89.6)	52 (89.6)
After 1 month	17 (29.3)	20 (34.4)	20 (34.4)
6 months	20 (34.4)	22 (37.9)	22 (37.9)
1 year	25 (43.1)	27 (46.5)	27 (46.5)

Table 3: Comparative evaluation among oral health behavior change in reinforced and nonreinforced group

Time period	Behavior change		P
	Reinforced	Nonreinforced	
1 month	23 (79.3)	10 (34.4)	0.046*
6 months	21 (72.4)	9 (31.1)	0.026*
1 year	20 (68.9)	8 (27.6)	0.026*

Statistical test employed=Unpaired t-test. *P≤0.05=Statistically significant

Piaget believed that children go through four universal stages of cognitive development, i.e. sensorimotor stage (Birth-2 years), preoperational stage (2–7 years), concrete operational stage (7–11 years), and formal operational stage (11 years and over). Piaget did not claim that a particular stage was reached at a certain age.

Stages of development

Piaget believed that children go through four universal stages of cognitive development. A child’s cognitive development is about a child constructing a mental model of the world. Each child goes through the stages in the same order, and no stage can be missed out – although some individuals may never attain the later stages. There are individual differences in the rate at which children progress through stages. Piaget did not claim that a particular stage was reached at a certain age – although descriptions of the stages often include an indication of the age at which the average child would reach each stage.

Sensorimotor stage (birth-2 years)

The main achievement during this stage is object permanence – knowing that an object still exists, even if it is hidden. It requires the ability to form a mental representation (i.e. a schema) of the object.

Preoperational stage (2–7 years)

During this stage, young children are able to think about things symbolically. This is the ability to make one thing – a word or an object – stand for something other than itself. Thinking is still egocentric, and the infant has difficulty taking the viewpoint of others.

Concrete operational stage (7–11 years)

Piaget considered the concrete stage a major turning point in the child's cognitive development because it marks the beginning of logical or operational thought. This means the child can work things out internally in their head (rather than physically try things out in the real world). Children can conserve number (age 6), mass (age 7), and weight (age 9). Conservation is the understanding that something stays the same in quantity even though its appearance changes.

Formal operational stage (11 years and over)

The formal operational stage begins at approximately age eleven and lasts into adulthood. During this time, people develop the ability to think about abstract concepts and logically test hypotheses.

The present study shows the prevalence of three characteristics as 84.4%, 89.6%, and 89.6%, respectively, with a decrease in prevalence after the interventional counseling. The present study is in line with a study conducted by Asokan *et al.*^[9] who also reported prevalence of 65% ego centralism, 84% centration, and 89% lack of conservation and reversibility in school children. The present study utilized health promotion as a medium of improving oral health among the students which is in line with the study conducted by Mortezaei Banaye Jedd *et al.*,^[10] who also reported that health promotion models may be used as an appropriate framework for identifying factors and developing educational interventions, aiming at improving oral health behaviors among students. The significant improvement in behavior change following interventions is in line with the study conducted by Wide *et al.*,^[5] who also reported improved oral health behavior following a brief psychological intervention.

The role of teachers in imparting oral health education and promotion has been found to be effective in a number of studies.^[11] The present study also utilized school teachers in improving oral health of school children by reinforcement following behavior intervention.

Conclusion

Based on the present study, it can be concluded that the Piaget's characteristics were consistent for a follow-up of 1 year. These characteristics, if effectively modified, can ensure effective delivery of oral health education, awareness, and proper development of psychological characteristics among children. Stress reduction among caregivers and children can be expected as a long-term effect of such intervention.

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Conflicts of interest

There are no conflicts of interest among the authors.

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