



Developments during adolescence: A critical transition phase of human life

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Abstract

Adolescence is a transition period characterized by rapid physical, social, emotional and cognitive growth. There are significant changes in body and mind of adolescents. During adolescence, changes in pubertal hormones play fundamental role to attain sexual maturity. During this period skeletal maturity is achieved due to changes in body fat composition. Adolescents undergo considerable changes at psychological, social and cognitive levels to assess and solve the complex situations. They desire to become independent thereby leading to conflicts with the parents. They expand their bonds with the peers and try to establish their identity in the society. It is a crucial stage of development when socio-emotional problems may inhibit the overall growth of an individual. Therefore, it is essential that parents, teachers and health care providers should have a deep understanding of the different developmental stages of adolescents.

Keywords: adolescents, biological, cognitive, psychosocial, puberty

Introduction

Adolescence refers to the transition period between childhood and adulthood that is characterized by rapid development due to adolescent growth spurt ^[1, 2]. Adolescence has been defined by the World Health Organisation ^[3] as the period of life from 10 to 19 years. Most of the researchers have classified the period of adolescence into three developmental stages, early adolescence (10-13 years), mid-adolescence (14-17 years) and late adolescence (18 to early 20s). Adolescents currently account for approximately 20% of the world's population and the numbers are still growing ^[4]. It is that critical stage in human life cycle when adolescents use their full potential to achieve their desire to become independent and have a unique identity. It is a time of transformation that is characterized by discrete changes in physical appearance, behaviour towards peer group, parents and a drastic change in their cognitive abilities. Although set within cultural contexts, these transformations appear to have biological roots that are deeply embedded in our evolutionary past ^[5].

Researchers have described this phase of life span as a tunnel which is long and darker for some people but everyone has to pass through it. The way every individual passes through it with the help of people around him/her determines the temperament of an individual. Adolescent's physical growth with the optimal nutrition and unconstrained environment attain adulthood at par with their genetic potential after attaining linear growth spurt associated with puberty and completing the skeletal growth. Early maturers are ahead of their counterparts in physical growth as well as skeletal and sexual maturity. Consequently, in place of chronological age, sexual maturation should be used to ascertain the degree of biological growth and development and the individual nutritional needs of adolescents ^[6]. In the physical growth context, with the development of secondary sexual

characteristics, the pubertal hormones drive sexually dimorphic signals to the brain to select their partners ^[7]. At this stage of life, the adolescents take more responsibilities and think to have a self-control on their behaviour ^[8]. During this crucial stage, regulation of emotions becomes a challenging task for them ^[9, 10]. Thus, adolescence is a phase where an individual face many social-emotional problems like anxiety, depression and bipolar disorder ^[11, 12]. Moreover, there are many more problems, related to the influence of peer groups, such as alcoholism, aggression, violence and risk taking behaviour ^[13].

Adolescence is the time to develop the right attitude and beliefs needed for effective participation in a society. A thorough understanding of adolescents in society depends on the inputs from various fields, including psychology, biology, history, sociology, education, and anthropology. Within all of these perspectives, adolescence is viewed as a transitional period between childhood and adulthood, whose cultural purpose is to prepare a child to play a role of an adult within a society ^[14]. Developmental processes are usually separated and studied in different domains like physical, cognitive, psychological, and moral development. These different domains interact with each other and progress as a whole during adolescence.

Biological Development

The biological development of an adolescent is indicated by the onset of puberty, which is defined as a complete transformation of the physical appearance of a child to an adult ^[6]. The change in the physical appearance is attributed to increase in skeletal mass, weight and height. The most important change that occurs during adolescence is the sexual maturity which is directly linked with the pubertal hormones. Every adolescent has to experience these events but the time

of occurrence may vary from individual to individual. Besides genetic differences, this difference is directly linked to their nutritional status. These variations in the time of occurrence of these phases may be attributed to the poor nutrition. Inadequate diet at the time of adolescence may result in delayed sexual maturation and slows down the linear growth. Thus, adolescents of the same chronological age can vary greatly in physical appearance. Besides genetic differences, this difference is directly linked to their nutritional status. The nutritional requirements of an adolescent in terms of calories and micronutrients are very important during the peak of adolescent growth spurt. At the peak of growth spurt these requirements may be twice as high as those of the remaining period of adolescence ^[15]. The physical development which is accompanied by the growth in different parts of the body is a regular sequence among all the adolescents, although the different body parts mature at different times. Firstly, head, hands and feet will increase in size followed by arms, legs, trunk and shoulders ^[16]. Distribution of fat and muscles is a significant feature of adolescence. There is no significant difference between the distribution of fat and muscle before puberty however; males and females may be differentiated on the basis of fat and muscle distribution during puberty. Among adolescent boys, the muscle grows faster than adolescent girls but the fat growth shows opposite trend ^[17]. Change in weight and composition is clearly evident during adolescence. Approximately half of the adult body weight is gained during the period of adolescence. In females, average weight gain during puberty is around 15.5 kg however, it slows down at the time of menarche. The boys gain a mean weight gain of approximately 23.7 kg during puberty ^[18, 19]. Almost all the researchers agree with the fact that the age at puberty and the changes occurring during this time are influenced by many factors including the nutritional status, ethnicity, genetics and the health of an individual. Thus, the biological development of an adolescent should be studied and evaluated in the light of genetic, socio-economic and environmental factors.

Psychosocial Development

Psychological development of a person is the ability of one's mind, emotions, and maturity level that develop psychosocially at different rates depending on the interaction between biological and environmental factors ^[20]. The dramatic physical changes during adolescence affect the psychosocial development of children especially between the age of 11 and 21 years. Weiner ^[21] also suggested that "adolescence begins with the youngster's initial psychological reaction to his pubescent physical changes and extends to a reasonable resolution of his personal identity" which occurs between the age of 11 and 21. The most prominent theorist of emotional development stated that during this phase, adolescent's most important task is to solve the identity versus role confusion crisis ^[22]. They construct their own unique sense of identity and try to find the social environment to which they belong and create meaningful relationships with other people ^[23]. According to Erikson's theory, an adolescent goes through a phase of crisis in the process of self-defining ^[24]. The risk taking and reckless behaviour in adolescents is other prominent feature, highlighted by many authors.

This is wholly attributable to the hormonal changes during puberty. The tendency of outbreak of such behaviours is increased between early and middle or late adolescence but ceases or decline in early adulthood. The risk taking may be in the form of violent and non-violent crime ^[25], crashes and fatalities while driving ^[26], unprotected sex ^[27], attempt to suicides ^[28], accidental drownings ^[27], self-inflicted injuries ^[29] and try to start tobacco, illicit drugs etc. However, rebellious, immature and irresponsible behaviour among adolescents is normal and healthy, the features that will pass, as they move on towards adulthood ^[30]. Although, behavioural changes that occurred during adolescence have been correlated with the hormonal change but little research has been done on it, so far ^[31]. Psychosocial and cognitive development can be better studied by dividing the period of adolescence into three phases: early adolescence (11-14 years), mid adolescence (15-17 years) and late adolescence (18-21 years). Each phase is characterised by particular emotions and skills ^[6]. During early adolescence, children focus on themselves around developing a new self-image due to their physiological changes. They start to use their new skills of logical thinking to make judgments rationally. When they enter the middle phase of adolescence, intellectual and emotional capacity increases tremendously and they loosen their ties with their parents. They have a fight over the rules set by parents and have their own values. Moreover, they become self dependent and have self control. They are able to create their own identity and take responsibilities within the society. During late adolescence, adolescents have a more stable identity and place in society. They start to establish balance between fantasies and realities. They are concerned and start caring for others. Many psychological problems like depression, sleep disorders, guilty, shame, distrust, inferiority complex, suicides, teenage pregnancy etc have been encountered by adolescents during different phases of adolescence. In the late adolescence period, adolescents have set aim for their lives and also have ascertained their roles in the society.

Cognitive Development

Many recent MRI studies have shown that even during adolescence, brain undergo several developmental stages. These structural changes occur in the cortical regions of the brain ^[32]. The simple structural changes like ratio of white and gray matter in the brain, express significant changes into the late adolescent years ^[33, 34, 35]. The interaction between these biological structural changes in brain and knowledge, experience and social demand results into rapid cognitive growth. Inhelder and Piaget ^[36] was a pioneer researcher, who extensively worked on the development of intellectual abilities among children. His theory on cognitive development is most widely used and accepted. According to this theory, children's cognitive development can be studied through four stages—seriomotor (birth to two years of age), pre-operational (2 to 7 years of age), concrete operational (7 to 11 years of age) and formal operational (11 to 15 years of age). Each stage represents a qualitative increase in the ability of a child to solve problems and reason logically. The cognitive development among adolescents demonstrates their volunteerism in caring and helping others ^[37]. This cognitive development i.e. emotional, intellectual and behavioural

development has yet not been fully studied, but is well documented by various authors as significant period to study the considerable changes in brain structure and functions at anatomical, cellular, molecular levels ^[38]. Cognitive development is distinctive in different phases of adolescence. Reckless behaviour, ego-centric and concrete thinking among adolescents dominate during the early adolescence phase. Lack of abstract reasoning and necessary skills to solve the problems is evident in young adolescents. Even they are not able to make out that how their current behaviour is going to affect their future health status ^[6]. Middle adolescence period is considered as a phase of detachment from the parents. Adolescents loosen their ties with the family because of the fight over self-made values versus the rules formulated by their elders. There is a remarkable growth in emotional independence. Peer groups become more important than family. Abstract reasoning starts to develop among middle adolescents however; they are not highly skilled and often depressed when they face a stressful situation. In the late adolescent period, biological growth has been stabilized; emotional and financial dependence upon the family has been decreased. Abstract reasoning is still in progress even in older adolescents. At this stage, adolescents are capable of solving the problems. They emerge as a unique identity and are not influenced by a group of peers. The beliefs and concepts developed during this phase drastically influence the future life and play a role in building the character and personality as an adult ^[39].

Social Development

Involvement of adolescents with the peer group, community and society has become an interesting area of research. Social and emotional developments are entangled terms. Control over emotions and its expression are required for successful interpersonal relationships. Cognitive development improves the quality of interpersonal relationships as it facilitates the adolescents of better understanding about the feelings and needs of others. From childhood to adolescence, complexity of thoughts increases which results into complex social relationship as well. During childhood, the social sphere is more or less confined to the parents, siblings, few friends and teachers however, during adolescence; many different types of relationships with different levels of intimacy come in one's life. Therefore, during adolescence, there is a change in the quantity and quality of social relationships.

After attaining physical development of the body, sexual maturity with pubertal hormone growth, the adolescence is characterised by the involvement of youth in group interactions ^[40]. During early and middle adolescence period, because of the emotional and cognitive development, youth is trying to be independent and establishing their identity ^[41]. As a result, they usually have a conflict with their parents and other elderly people in the family. They raise questions regarding the rules of the parents. They become rebellions sometimes and disobey the parents or otherwise they accomplish their wilful wishes privately. They spend more time with their friends than their parents and therefore, are influenced more by the peer group at time of adolescence. Dating and early romantic behaviour usually begins during middle adolescence years ^[42]. Parents, teachers and

professionals should help adolescents by guiding them about the health aspects of developing sexuality. In the late adolescent period, the intimate relations mature and become stable. Adolescents up to their late teen age are surrounded by many different types of relations. These multiple relations compete for their time, attention and energy. At this crucial stage, they learn to balance these multiple relations. Moreover, this is the time when they work to decide about their future goals. For the successful completion of higher education and to achieve the employment, they need to be cooperative with the peer group. While working in the groups on projects or assignments, they should be supportive and helpful and at the same time, should prove their leadership qualities. The engagement of youth in societal affairs is supposed to be a result of the extracurricular activities organised at schools and community levels ^[43].

Majority of the scientific fraternity agreed with the fact that civic involvement of the youth greatly enhances the development of understanding, interdependence, democracy, attachment, affection and moral and civic identity ^[44-49].

Conclusion

Adolescence is a period of transformation characterized by changes in behaviour, physique, cognition and brain. A youth enters the early adolescence phase with a level of child body and mind. With numerous physical, social, psychological, emotional and cognitive developments, a youth exits the adolescence with a mind and body of an adult. This period of 10-12 years is vulnerable due to the gaps between the stages of developments. While examining the different developmental aspects of this transition phase of life, we found that there is an interpersonal relationship between different developmental aspects. However, youth may vary in their ages while reaching a particular milestone during the process of development. In terms of physical development, the body changes its shape, size and composition. Apart from these changes, teens develop primary and secondary sex characteristics because of changes in pubertal hormones. During this period the nutritional needs of individual increases approximately twice. Cognitive skill advances rapidly during adolescence period. At this stage brain starts to adopt more sophisticated methods of storing information and its rapid retrieval. Reckless behaviour, ego-centric and concrete thinking among adolescents dominate the early adolescence phase. Young adolescents show their detachment with their parents. Youth in the late adolescent phase have necessary skills to solve the problems. Abstract reasoning still remains in the developing stages even in the last phase of adolescence period. Even emotionally, they tend to cope up with the challenges of intense emotional situations. Socially, they become independent and expand support to the peers. Conclusively, it can be stated that this transition stage is critical from the view of overall development of child to adult. The guidance and support of parents, teachers and health professionals can help the adolescents to develop socially, physically, emotionally, cognitively and morally at par with their genetic potential.

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