



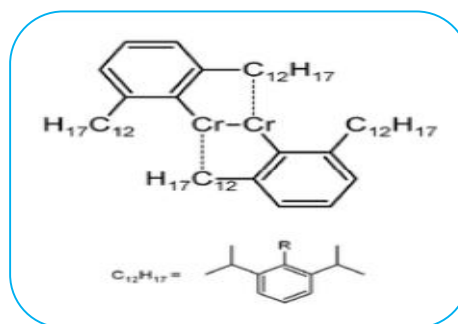
## EFFECT OF CHROMIUM ON THE PERCEPTUAL SKILLS OF THE ADOLESCENTS

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### ABSTRACT:

The present study aims to examine the effect of chromium on the development of perceptual skills among the adolescents of chromium affected and non-affected areas. An ex-post facto research was conducted with 100 adolescents aged 14-18 years old, selected from the schools of Kanpur city (n=50, from chromium affected area as experimental group, and n=50, from unaffected area as matching control group). The adolescents were tested individually on Embedded Figure Test (B. Nigam). Data was analyzed by using Mean, S.D., and t-test. The result shows a significant difference among the groups, which reveals that the chromium affected area adolescents shows poor perceptual skill as compare to unaffected area adolescents.



**KEY WORDS:** Chromium, Perceptual skills, Adolescent

### INTRODUCTION:

Chromium is a naturally occurring element found in rocks, animals, plants soil and in volcanic dust and gases. Chromium is present in the environment in many different forms. The most common forms are Chromium (0), Trivalent (chromium III), and Hexavalent (chromium VI). Chromium (III) is an essential nutrient required for normal energy metabolism whereas Chromium (VI) and Chromium (0) form, are generally produced by industrial processes. No known taste or odor is associated with chromium compounds.

The use of Chromium in the tanning process is an environmental problem attracting considerable attention. Pollution of ground water is one of the critical problems where tanneries play an important role in it. India's Central Pollution Board (CPCB), categorize tanneries under the Red category of industries because tannery wastes have the worst environmental impact on water bodies. Tanneries use a large amount of chromium and other salt to clean and cure the skin and hides. Tannery effluents contains high concentration of chrome which is toxic element, chloride and sulfide too. Tanneries generate wastewater in the range of 30-35 L kg<sup>-1</sup> skin/hide processed with variable pH and high concentrations of suspended solids, BOD, COD, tannins including Chromium (Nandy, et al., 1999). Many studies have shown that high levels of fluoride, nitrate, metals, and persistent organic pollutants are a health risk for human populations (Wu, et al. 2020). This is especially critical for infants and children who are more susceptible to the effects of these contaminants than adults (Karunanidhi, et al. 2020; Subba Rao, et al. 2020)

In present scenario ground water contamination because of chromium is one of the critical problems in KANPUR (U.P.). Tanneries play an important role in it. The effluent of tanneries is causing

severely negative impact on crops and human health. The Central Pollution Control Board (CPCB) compliance report on water pollution by tanneries at Jajmau, Kanpur, U.P.

### PERCEPTION:

Perception is an active selective and cognitive mental process through which a person gains immediate experience of his own internal organs (internal environment) as well as objects present in external environment (Singh, 2000). Visual Perceptual skills involve the capability to unify and infer the information that is seen and give it meaning. Our eyes send large amounts of information to our brains to process every single second.

Several case studies reporting subtle behavioural changes such as worse cognitive, perceptual and motor changes as a result of chromium picolinate are scattered throughout the literature. (sited in [www.vanderbilt.edu/ans/psychology/health...../chromium\\_picolinate.HTM](http://www.vanderbilt.edu/ans/psychology/health...../chromium_picolinate.HTM)).

Seven heavy metals (cadmium, chromium, cobalt, lead, nickel, and silver) have associated with poor children's cognitive skills and health status (Koller, et al., 2004). Exposure to arsenic from drinking water is associated with reduced intellectual function (Gail, et al., 2004). Among possible target organs of heavy metals, the kidney and central nervous system appear to be most sensitive ones (Jugo, 1985).

Very few research has examined the consequence of excessive chromium exposure on perceptual skills in adolescents. Thus, the work aims to study the consequence of chromium on perceptual skills of the adolescents.

### Aim:

The major objective of the study is to examine the effect of chromium on the perceptual skills of the adolescents.

### Methodology:

**Sample:** The total sample compromised 100 participants. 50 adolescents from Chromium effected area as experimental group and 50 adolescents from unaffected area as control group. All subjects have been taken from age ranging from 12 to 16 years. Only literate subjects have been taken from the urban areas of Kanpur. Selection of the subject of control group has been dependent upon their residence and school. Selection of area has been determined with the help of UTTAR PRADESH POLLUTION CONTROL BOARD.

**Tool:** Embedded Figure Test (EFT) Indian adaptation by B. Nigam has been used to measure the perceptual skills of the adolescents. It is a personality test developed to measure field independency-dependency. The test material consists of 10 cards and 1 trial card. In each card there is a design on the left side of the card. There are four alternative complex design on the right side of the card. In one of the designs; the design on the left is hidden. The problem is to perceive the design, in the alternative, in which it is hidden. The errors calculate the scores. More the errors lower the scores, which shows poor ability to perceive.

**Procedure:** Each subject was tested individually in a good environment. Subject were instructed that in each of the following questions, you are given a figure (X) followed by four alternative figures (1), (2), (3) and (4) such that figure (X) is embedded in one of them. Trace out the alternative figure which contains fig. (X) as its part. All the participants were told that their secrecy will be well-preserved.

**Statistical Analysis:** In order to meet the research objective data was analyzed through Mean, SD., and t-test, to study the effects.

## Result and Discussion

**Table 1: Mean and SD of the two groups on perceptual skills.**

Variable Group	Experimental Group N=50 (affected area)		Control Group N=50 (unaffected area)	
	Mean	SD	Mean	SD
Perceptual Skills	9.74	2.06	11.01	1.89

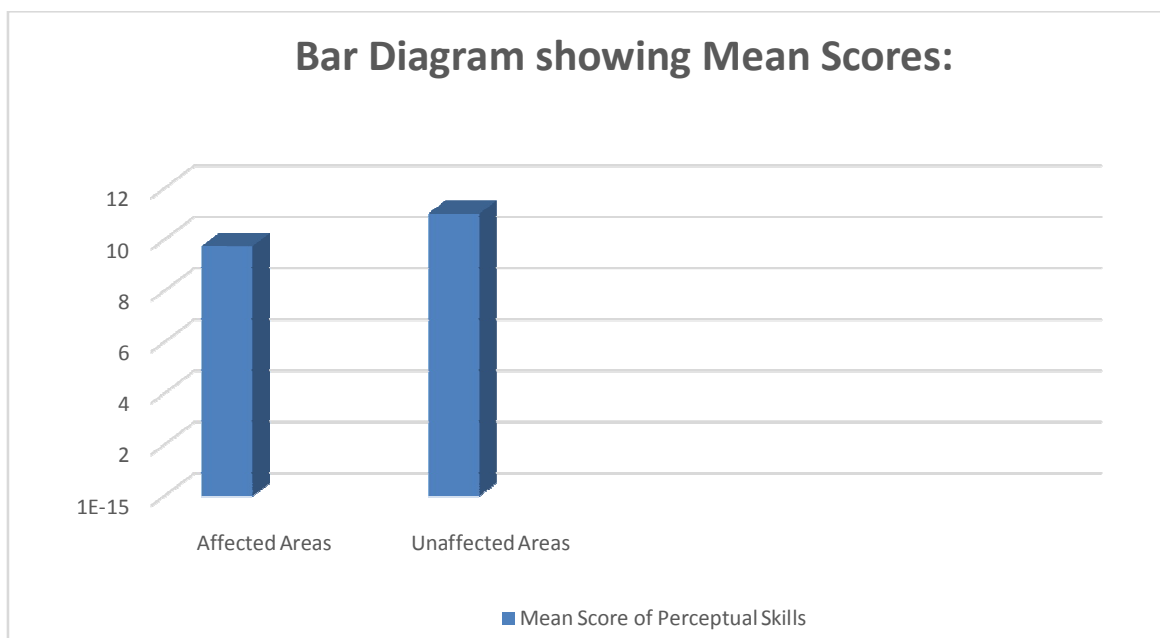
**Table 2: t-test conducted among two groups on perceptual skills.**

Group	Mean	SD	SE.D	t-ratio	Result
Affected area (n=50)	9.74	2.06	.395	3.342	Significant .01**
Unaffected area (n=50)	11.01	1.89			

Sig. .05\*, .01\*\*

Result presented in table 2 shows a significant difference among the groups on EFT  $t = (3.342)$ , means that perceptual skills differ in separate groups. Table 1 shows that the mean score of unaffected areas adolescents (11.01) is higher than the mean score of affected areas adolescents (9.74). It means Chromium affected areas adolescents shows poor perceptual skills as compare to unaffected areas adolescents.

**Bar diagram** also shows the difference among the two groups.



The present study was proposed to examine the perceptual skills among the adolescents of chromium affected and unaffected areas. There is bulk of literature that has shown adverse effect of heavy metals over physical and cognitive development of human beings.

Chromium is a transition element occurring in the environment. It is considered to be essential trace metal in humans (Anderson, 1981). Chromium (iv) compound are known to induce both acute and chronic toxic effects (ATSDR, 2000). Several animal studies provide evidence that chromium (iv) is a developmental toxicant (Junaid et.al., 1996; Kanojia, et.al., 1996; 1998). The developing brain is uniquely vulnerable to environmental insult (Rice & Baron. 2000). The primary health hazards caused by chromium are bronchial asthma, lung and nasal ulcers and cancers, skin allergies, reproductive and developmental problems and this chromium is carcinogenic in nature. When taken in excess it may cause death also (Shekhwat, et al., 2015).

The result of the present study reveals that the performance of experimental group ( $M=9.74$ ) is poor in comparison to control group ( $M=11.01$ ) and table no. 2 is clearly showing significant difference ( $t=3.342^{**}$ ) between both groups. Perception is a complex cognitive process through which we interpret and analyze the initial information coming through the senses (Darley, 1981). Several case studies reporting subtle behavioural changes such as worse cognitive, perceptual and motor changes as a result of chromium picolinate are scattered throughout the literature. (sited in [www.vanderbilt.edu/ans/psychology/health...../chromium\\_picolinate.HTM](http://www.vanderbilt.edu/ans/psychology/health...../chromium_picolinate.HTM)).

The result is gaining support from these studies, so it can be said that chromium exposure adversely affects the perceptual skills of adolescents.

### CONCLUSION:

Water pollution is one of the major environmental issues in India. This pollution is caused by the expulsion of pollutants directly or indirectly into water bodies without any concern for its toxicity or its effect on the environment. There is dearth of studies in relation to the effect of chromium on the complex cognitive processes as perceptual skills on adolescents. The present work was designed to study the effect of chromium exposure on perceptual skills of adolescents, the result revealed that Chromium affected areas adolescents shows poor perceptual skills as compare to unaffected areas adolescents. Exposure of chromium adversely effects the perceptual skill processes.

### RELEVANCE OF STUDY:

As we pursue a path of conscious living, we must extend our awareness to the environment, which ultimately is a part of us and will affect us physically, mentally and spiritually. Findings of the present study shows that exposure to chromium adversely affect the cognitive development in adolescents. Thus, these type studies develop awareness to control the pollutants which have toxic effect on living organisms. With awareness we can contribute to the curing of the Earth, decline the impact of our own ecological footprint, and share our facts with others.

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